



## The Cast Gold Filling--A Critical Survey.

By C. KABELL, D.D.S., Chicago, Ill.

The art of casting fillings is now out of its baby shoes. We have had time to test the assertions and predictions made at the day of its first introduction into dentistry. I can not speak for the profession, because I had little time and opportunity to discuss the topic with my fellow dentists, and ocular inspection of the work of others has up to date been rather limited, although the few fillings I have seen have proven to my satisfaction that they show the same deficiencies which I had discovered in my own work, and this article is partly written to publish my technique to remedy the defects caused by shrinkage.

Very sorry I am that I have to contradict Dr. Taggart in his claim that his invention produces exact fitting fillings. For three reasons it is impossible to get a mathematically correct gold cast.

The three reasons are in the order of manipulation. First: The shrinkage of the wax. Second: The expansion of the investment compound. Third: The shrinkage of gold.

**Inlay Modeling Wax.** Let us consider these in succession. I hope every dentist has noticed the quite perceptible shrinkage of molten wax, also of paraffin. Both have a melting-point of between 160 and 170 degrees. Therefore, a modeling wax which mostly consists of these materials, heated to 135 degrees, will necessarily shrink about three-fifths



of the actual shrinkage of molten wax. This might not amount to much, but has this drawback. In compound fillings this shrinkage will cause warping, which is a little more serious, but, of course, unavoidable.

**Investment Compounds.** Dr. Price's experiments have shown the variation of expansion of different investment compounds; the only tables missing were exact data of the effect of different temperatures on each separate mixture.

It is admitted to be possible, theoretically, to equalize the combined shrinkage of gold and wax by a corresponding expansion of the investment, if the co-efficient of expansion of the latter were known, and one furthermore, experimentally determines what rôle the kaolin (contained in most compounds) plays by partly glazing or baking through the heat of the molten gold.

At present the only way to obtain the best possible results is to cast into a well-heated investment, and the most ideal compound is the one that when so heated will not drop out of a smooth ring, thereby showing that its expansion is almost equal to the expansion of the metal of the ring.

**Gold for Casting Fillings.** Different theories have been given why cast gold is not supposed to shrink.

Let us consider by the application of physical laws the claim that gold under pressure loses some of its contraction.

It is possible to contract gold in its cold state by hammering, but we need a steel anvil and hammer to do this. How then is it possible to contract gold even when in a molten state on an anvil of such frail material as the investment of a resistance so little that we can pulverize it between our fingers?

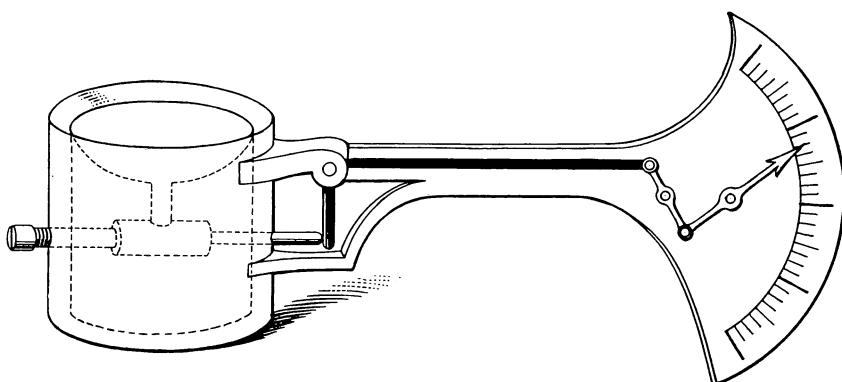
Or, as the expansion and contraction of a metal is the same under the same range of temperature and we know that a metal bar of one square inch in diameter develops a force counted by tons of pressure upon extreme expansion, how can a force of ten pounds counterbalance this expansion to any noticeable degree? The only thing that pressure might accomplish could be to solidify gold at a higher temperature than normal, analogous to the well-known variation of the boiling-point of water under different pressures.

Based on this law is the contention of geologists that the center of our earth is not a molten mass, in spite of a temperature several times higher than the melting-points of all known substances, on account of the pressure of gravity and the crust of the earth.

In order to show plainly that cast gold shrinks I had a little machine built of the following description: A casting ring was laterally

perforated on either side by a round hole, into which two sprue wires were placed. One of them was securely fastened by a screw arrangement while the other fitted loosely (see illustration). Between the points penetrating into the center of ring a bar of wax was fastened, connected in the regulation way by sprue and invested so that it could be burned out and cast.

On the outside end of the movable pin rested the short arm of a lever, whose long end by appropriate transmission would magnify the movement of the short lever two hundred times.



The metal when cast would unite with the heads of the two pins, which previously had been covered by the wax and as the one pin was securely fastened, any contraction occurring in the cast by cooling would pull the loose pin inwards, the short lever being pressed against the other end of pin by the weight of the longer arm would follow, and the hand of the dial would show this movement two hundred times magnified.

If I took care to have the points of the two pins equally apart all the time no variation in the shrinkage could be noticed whether casting under three or twenty-five pounds pressure.

This machine is far from being scientifically exact, but, in spite of this, will convince every one that the shrinkage of gold is an absolute certainty.

If any one would ask me where the advantage of pressure casting lies, in comparison to the old common way, I should answer that Dr. Taggart has shown by his invention a positive way to overcome the tendency of gold and other metals, when in a semi-cohesive or molten state, to globulate. That is all, but it has been sufficient to revolutionize dentistry.



### **Method of Producing Perfect Margins.**

The practical value of the cast filling, its ease of manipulation to the patient, and its time-saving advantages are appealing to me as to everyone, and I employ it wherever it shows a saving of time compared with the malleted filling, but I have been forced to change my technique.

Instead of carefully trimming down all overhanging edges I leave a little surplus over all margins and after setting and allowing the cement to harden fifteen or thirty minutes, trim down the edges with gold finishing burs and repeated burnishing.

In doing this care must always be taken that the tool rotates from gold to margin. For example, if I finish an occlusal filling in a right lower molar I trim the labial margin by running the engine the regulation way from left to right, but reverse the motor when working on the lingual margin and do not forget to lubricate burs and burnishers with vaseline.

By these means I have succeeded in closing the margins perfectly as far as can be determined by ocular and exploratory inspection.

This sealing of margins is necessary in the light of our past experience with cements of the consistency used in setting of the inlays, which is the same as has been employed for a few decades for setting crowns and bridge work.

I have removed very few crowns, etc., that did not greet me with that foul odor that cement stores up in its pores, and I have more often than not seen decay recurring under even well-mixed cement fillings.

The thinner the cement the more easily is it washed out and cracks form that invite decay.

In cases where the shrinkage and warping of the filling would be too great to overcome by burnishing, I employ a different technique.

The gingival margin has always been the weakest part of a filling, showing the greatest percentage of recurrence of decay, and it is also the vulnerable point of inlays. As it is in most cases impossible to properly burnish gold to place between the teeth, I help myself by beveling, giving the edge an angle of about 120 degrees.

The corresponding gingival margin of the inlay will show a V-shaped form, the outer edge of which I burnish inward and depend on the malleting to open it sufficiently to make it fit snugly. If, upon examination, I find any opening I repeat and only after being certain of a perfect fit will I cement filling into place.

The application of the casting method to bridge work lastly has not only opened a new field of technique, but, in my opinion, has brought bridge work to the acme of perfection and deserves a separate article, which, if not anticipated, I promise in the near future.

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## A Peculiar Condition---How to Meet It.

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By DR. L. P. HASKELL.

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What are the prime requisites of an upper artificial denture? A perfect fitting plate, fair adhesion, proper occlusion and proper arrangement of the teeth and artificial gums to restore the features to normal condition.

What is a proper occlusion? Exact pressure on the bicuspids and first molars, the second molars not quite in contact, and no contact in any case of the anterior teeth.

Why no contact of the anterior teeth? Two reasons: First, contact with the upper teeth in the usual overbite tends to displace the plate, as the leverage is so great from the tips of the teeth to the rear of the plate. Second, undue pressure across the anterior margin of jaw causes undue absorption of the bone, leaving what so often is seen, a flexible ridge.

A peculiar condition at times occurs, difficult to overcome, and for which there is but one successful solution. Remaining on the lower jaw are the anterior teeth and two or three roots upon which are crowns. Some dentists advise the retention of the roots and crowns. What results? The pressure is on the anterior and left posterior teeth, covering two-thirds of the upper jaw with no pressure upon the right third. The denture is not balanced and sooner or later the bone is lowering, especially in front; the plate becomes a misfit and loosens.

What is the remedy? Some say a partial lower. That is all right so long as it remains intact, but it is only a question of a short time when it settles, and the pressure reverts to the front and left side. The proper thing to do, in order to secure permanent and satisfactory results, would be to extract roots on the left side, put in a temporary partial lower, setting the teeth high enough to well clear the anterior teeth; then at the end of the year, or sooner, replace with a permanent denture; thus the upper denture is evenly balanced and absorptions arrested.

With regard to the matter of extracting certain teeth, no matter how sound, the only question should be "What shall be done to make the denture the most comfortable and useful?"



## Base Metal versus Noble Metal Appliances in Orthodontia.

By CLARENCE JONES GRIEVES, D.D.S., Baltimore, Md.

*Read before the American Society of Orthodontists, Washington, Nov., 1908.*

In these latter days of many written words and few thoughts those who rush into print should promptly apologize at the very beginning or show "reason for the faith that is in them." The object of the investigations reported herewith is to obtain, if possible, ideal materials which exposed in the human mouth will accomplish quickly, definitely and finally the movement and retention of teeth and at the same time do no damage to denture, associated parts and the general good health, and still be not offensive in appearance.

All agree that these ideals are next to impossible and with reason such are the various and oftentimes directly opposing physical force required in one small appliance exposed in a persistently trying electro-chemical environment; all also agree that the materials now generally in use are glaringly defective; therefore the writer will feel amply justified if he "but scratch the matter."

In approaching this subject we find our interest centered at once in the damage existing in the form of corrosion or disintegration of both teeth and appliances which in this instance could be produced only by acids acting at minute distances, such are the dilutions of the human mouth, and resulting from an acid producing environment.

A careful review of the latest and best thought on enamel decalcification in early life shows, that in mouths predisposed to caries there are



but two environs necessary, *i. e.*, contact making "a retention center" of the carbohydrate media for ever present bacteria and protection of such contact that the gelatinous plaque, their habitat, may be undisturbed to the production of inorganic acids.

It is accepted that this is the usual method of acid production in the normal child mouth; fortunately we have little or nothing to do with the vitiated saliva of later life charged with the acid sodium phosphate, or oxalate series, or lactic acid caused by the neuroses or faulty metabolism; but granted such diathesis the mechanical contact center between tooth and appliance would be just as retentive of even a higher acid media, and hence more electrochemically active to the destruction of both teeth and appliance.

So the conditions are virtually similar and the orthodontist, in inserting appliances, frequently produces these damaging environs. Conditions differ so markedly with different appliances, the time of, and method of retention on the denture, that the writer perforce (and with no desire to raise again the discussion of methods) classifies all orthodontia appliances according to *method and time of retention*. Recognizing any classification as broad and necessarily defective, we have as follows:

*Appliances removable only by the operator,*

**Class I.** which may be divided into

*Division A.*—Arch bars, retainers, etc., with anchorage bands attached mechanically by bolts, etc.

*Division B.*—Arch bars, retainers, etc., with anchorage bands attached by some cementing medium.

*Materials.*—All alloys—German silver, plain or gold plated, platinum and iridium; 20 k. to 18 k. platinous gold, 18 k. to 14 k. spring gold, plain or gold plated. Coin gold and platinous coin gold.

*Solders.*—Gold, silver and soft solder.

*Ligatures.*—Silk, flax, rubber, sea grass and brass wire occasionally gold plated.

*Appliances removable by the patient, which may*

**Class II.** be divided into

*Division C.*—Wire cribs, spring plates, etc., in contact with tooth structure at few points, comparatively open, removable by the patient for cleansing and usually exposed to the "pump" of mastication.

*Materials.*—Same as Class I, often fixed to vulcanite, German silver or silver plates, plain or gold plated; steel wire springs, large masses of soft solder.



## ITEMS OF INTEREST

*Division D.*—Retaining combinations of united bars and bands in close contact with the teeth so comfortable as to be rarely removed.

*Materials.*—Same as Class I, Divisions A and B.

With the general idea of ascertaining the behavior of the different materials now in use and so differently applied a careful study has been

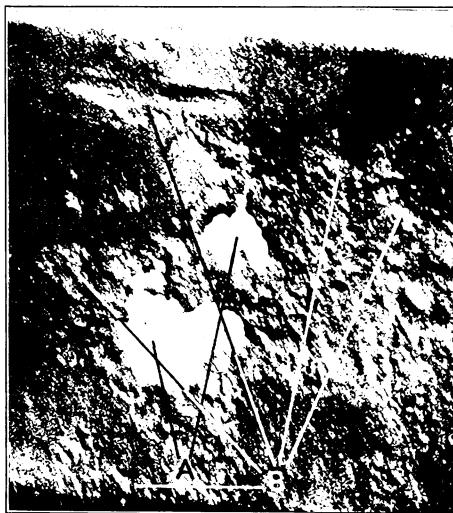


FIG. I.

Fig. I.—Tooth side of proximal section of gold-plated German silver anchorage band worn uncemented for three months, showing complete perforation of No. 26 gauge metal from electrolysis. (a) Perforations; (b) craters of bright metal by electrolysis, surrounded by dark sulphid deposits.

made; *first*, of the teeth and appliances *in situ* by the use of the Greenough binocular microscope; *second*, of the same just as taken from the mouth with low powers, later cleansed, cut to sections and examined with higher powers; *third*, the corrosion of appliances and teeth, how many, where and when most likely to occur; *fourth*, of the discoloration collected from used appliances and the saliva chemically as to the quantity and quality of salts and the acids concerned in formation; *fifth*, of the effect on the patient of the continued ingestion of such salts; *sixth*, physical laboratory tests of different alloys to determine relative flexibility, rigidity, tenacity, hardness, etc.

Here follows a careful tabulation of the results of the microscopic work under headings, "first," "second" and "third"; forty persons were examined by the binocular microscope; over four hundred appliances of all sorts were examined with low powers, many of these direct from the mouth, many sections were cut of wire, bars, bands, teeth, ligatures, plates, etc.

Referring to the classification by method we have under

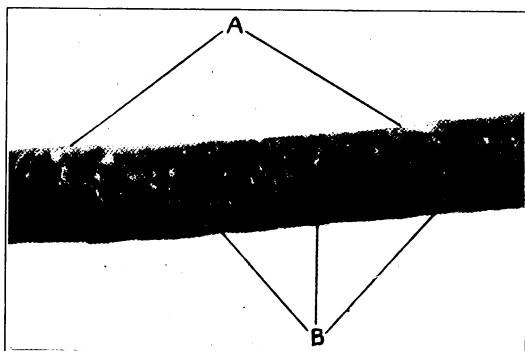


FIG. 2.

Fig. 2.—Corrosion of plain German silver arch worn two months. (a) Side in tooth contact; (b) higher craters; note that they occur first in tooth contact; later, all over.

*Plain German silver bars, bands, tubes, etc.—*

**Class I.**

**Division "A."** *Exposed for a short time.*—Corroded only in food retention centers; along the gingival line, particularly approximately, under bands and where ligature crossed bars; no etching whatever where parts were kept clean as by lips, cheeks and tongue, or where ends of arch bars were concealed in well-closed tubes.

*Exposed for a longer time.*—Corroded *all over* with loss of metal in retention centers where corrosion first began (Figs. 2 and 4).

*Gold-plated German silver bars, bands, tubes, etc.*—Loose plating in spots in retention centers shortly after exposure; following the rule above as to procedure and time of exposure the corrosion is much more violent and rapid than in the plain German silver, frequently proceeding to perforation of anchorage bands (Fig. 1) and destruction of the parts of arch bars adjacent to the teeth (Figs. 4 and 5).

No corrosion of bands under the gingival line.

Brass buccal tubes on anchorage bands and nuts on arches do not corrode so rapidly or deeply as does plain German silver (Fig. 3).

*Platinum and iridium, 20 to 18 k.; platinous gold, 20 to 18 k.; gold where no zinc occurred in alloy.*—Undamaged though discolored by sulphids by deposition and not corrosion; deeply stained where wire ligatures were in contact (Fig. 6).

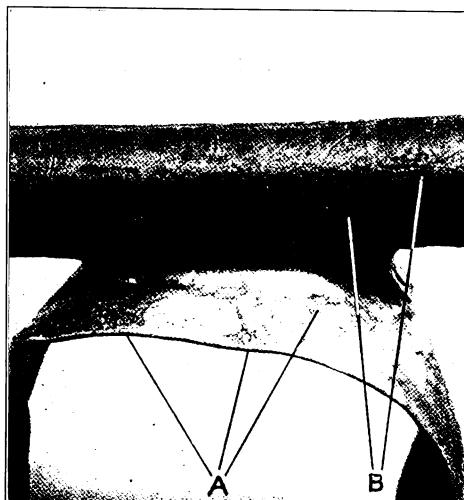


FIG. 3.

Fig. 3.—Section of German silver anchorage band with brass tube, after two months' wear. Note the craters of corrosion in the German silver at (a), and lack of such in brass tube; plier marks at (b).

*Fourteen k. gold alloyed with nickel and heavily gold plated.*—Not damaged, appearing as above, but when gold plating was lost due to wear, some etching.

*Platinous gold with zinc, or 18 k. gold with reducing alloys of brass like gold solders.*—Corroded slightly in retention centers; after long exposure all over.

Sulphidization begins first in German silver appliances, plated or unplated, where silver or soft solders attach tubes, hooks and screws; the gold-plating is lost here immediately and corrosion occurs around such centers. This is true in a less degree with any lower karat gold solders than 18 k., particularly when the reducing alloy is brass or spelter.

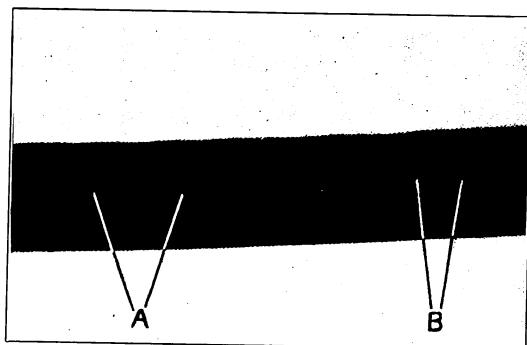


FIG. 4.

Fig. 4.—Front view of tooth side of gold-plated German silver arch, one month; (a) retention center "sore" of craters, beginning of corrosion; (b) corrosion and sulphid stain, ligature crossing.

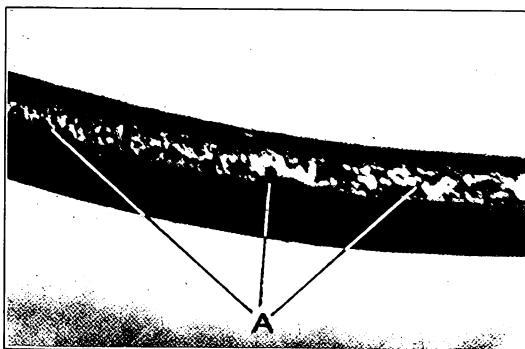


FIG. 5.

Fig. 5.—Corrosion of gold-plated German silver arch worn two months.  
(a) Crater occurring first at points where gold is lost

#### Ligatures.

Brass wire corroded quickly, often eaten almost through near arch crossings and approximately producing dark lines of salts on such crossings (Fig. 7).

#### Damage to the Teeth.

Whenever food retention centers occurred and were maintained, by anchorage bands about molars; at the tooth side of arch bars in tooth contact or crossed by wire ligatures, or upon approximating



ITEMS OF INTEREST

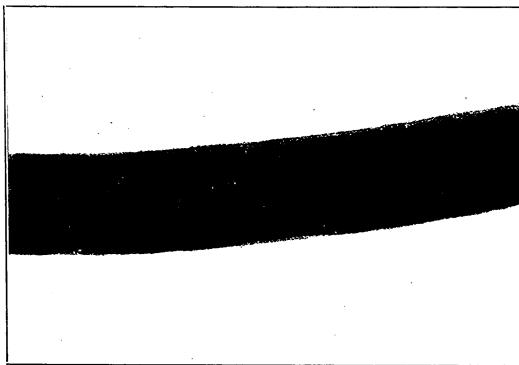


FIG. 6.

Fig. 6.—Platinous gold arch after four-months' exposure in the mouth; dark stains are from brass wire ligatures; no corrosion

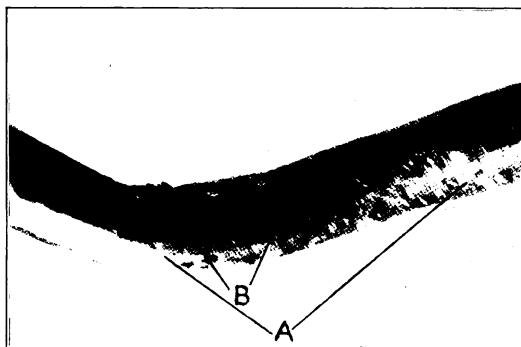


FIG. 7.

Fig. 7.—Section of brass wire ligature crossing gold-plated German silver arch, showing rapid corrosion. (a) Part exposed to retention center; (b) deep crater almost perforating at arch crossing.

surfaces near ligatures, etc., the enamel was frequently decalcified with exposure of the rod ends and disintegration of the inter rod substance and occasionally initial caries (Fig. 10).

These decalcifications were deep, proportionate to the time of exposure and shelter afforded from the "churn" of saliva in mastication and the cleaning movements of the lips, cheeks and tongue.

With the plain and gold plated German silver (particularly the lat-

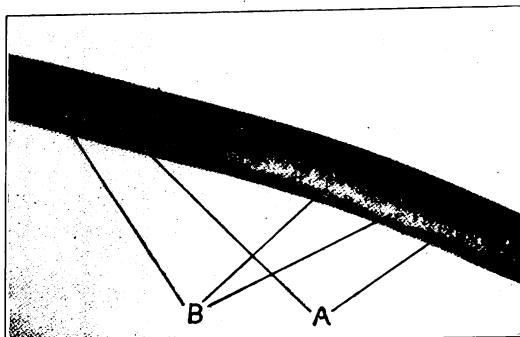


FIG. 8.

Fig. 8.—Section of plain German silver wire (finer gauge than same enlargement) from band retention center of removable crib appliance, as Class II, Division C. (a) Side in tooth contact; (b) small craters.

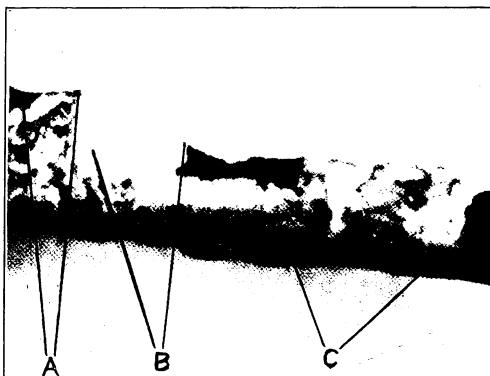


FIG. 9.

Fig. 9.—Rapid corrosion of piano wire—steel—six-weeks' wear in vulcanite split spring plate. (a) Original gauge; (b) crater almost severing wire; (c) salivary calculus.

ter) 14 k. gold, plain and plated, where plating abraded off, there occurred in the order named deposits of dark salts on the roughened enamel (Fig. 10); these stains came off in buffing and did not penetrate the decalcified inter-rod substance as does silver nitrate.

Platinum and iridium, platinous golds, and the higher karat golds having little or no zinc in the reducing alloys, all did greater damage to

the adjacent tooth structure than German silver; decalcified lines and spots were common, well marked and white without salt staining (Figs. 15, 16).

**Class I,  
Division "B."**

Here all the metals in arches, retainer bars, wire ligatures, tubes, etc., behaved exactly as in Class I, Division "A"; the effect, however, on anchorage bands was vastly different, the inner surface of which remained clean and bright, except where leakage occurred, as when first



FIG. 10.

Fig. 10.—Enamel decalcification, proximal surface, temporary molar, occurring under gold-plated German silver anchorage band, retention screw, no cementing needed. (a) Decalcified area. Set for a little over two months, experimentally, by Dr. J. Lowe Young.

set, due to the protecting power of the cement and there is yet to be found one corroded through, although on the outer surface and particularly at the gingival line the pitting was marked and typical.

**Effect on the  
Teeth.**

The damage to the teeth was the same except under anchorage bands where the difference was marked; the enamel had been perfectly protected by cementing substances and no decalcification occurred except an occasional fine line at band edges which was slight.

**Class II,  
Division "C."**

*Plain German silver cribs, springs, etc., exposed for a short time.*—Were etched adjacent to food retention centers, but to nothing like the extent of the fixed appliance, many showing little damage

(Fig. 8).

*Exposed for a longer period and when gold plated.*—The corrosion was deeper and extended finally all over the appliance. The gold plating was markedly defective.

It is rare to find platinum and iridium and gold of the higher karats in these appliances and there was no appreciable defect in that examined nor in the vulcanite retention. The masses of soft solder forming the bulk of many such appliances corroded like cheap amalgam and the steel or "piano" wire in springs was completely eaten out and disgustingly filthy (Fig. 9).

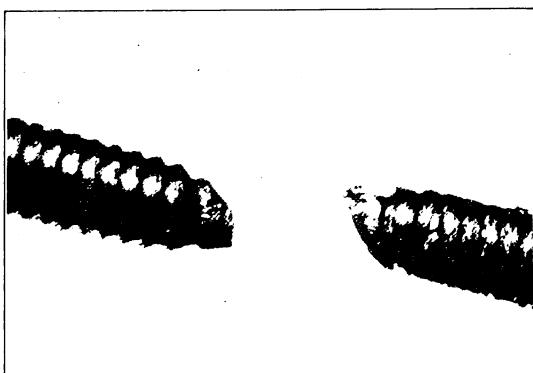


FIG. 11.

Fig. 11.—Reduction and fracture of threaded end of platinum and iridium arch under a load of 102.5 kilograms. Test Bureau of Standards.

**Effect on the  
Teeth.**

There was little or no appreciable effect on the tooth structure adjacent to these open fitting removable appliances; an occasional line occurring in a few cases where they were not removed, but it is rare to find a case where they are not frequently removed.

**Class II.  
Division "D."**

**Effect on the  
Teeth.**

The metals behaved in this division as in Class II, Division "A." The greatest enamel decalcification noted in these investigations was found under and about uncemented anchor bands, or bands which, cemented, had sprung loose in the fixed retainer forms apparently so comfortable as to be rarely removed; enamel disintegration with staining was the rule in German silver, and deeper white destruction of the enamel rods in the noble metals (Figs. 10, 16, 18 and 19).

To the most casual observer it is obvious in studying the foregoing data that the orthodontist is subject to the same laws, the result of experience and confirmed by chemistry and bacteriology, which have always governed those who attach any appliance in the human mouth. Be it a partial denture or the clasp attaching it, an interdental splint or obturator; a loose bridge abutment or a filling; when in such close contact as to prevent the cleanliness incident to the "laving churn" of mastication and the movements of the cheek, lips and tongue, and still not so loose as to become detached, in the dental tissues adjacent thereto, in a mouth pre-

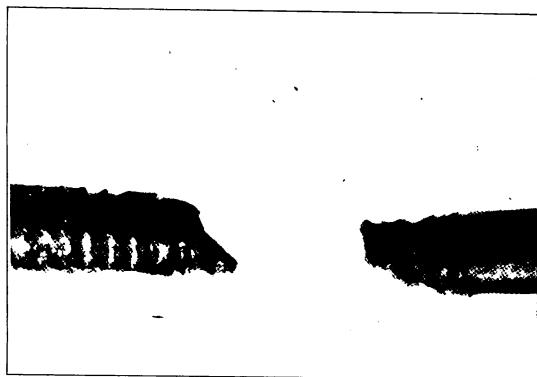


FIG. 12.

Fig. 12—Reduction and fracture of threaded end of platinum gold arch under load of 100 kilograms.

disposed to caries, there is produced either enamel decalcification primary to caries or true caries oftentimes extremely rapid (Figs. 18 and 19). Nothing is safe near a dental surface unless so near as to exclude saliva or so open as to allow acid dilution by saliva or as to be removed and cleansed.

Orthodontia is carried on in what might be termed the carbohydrate food period, or carious period of youth, particularly dangerous to the teeth of our race; a period not comparable with the later more immune time when artificial dentures are usually inserted.

It is also established by the data that less corrosion results to both denture and appliance when the appliance is of Class II, Division "C," cribs, springs, plates, etc., removable by the patient for cleanliness and open in contact with anchorage teeth, and we are "twixt the devil" of accomplishing orthodontia and the fear of ever finishing it correctly

with these open appliances, and "the deep sea" of promptly and exactly obtaining results by fixed appliances at the risk of damage to the teeth.

We are bound to be governed in the selection of methods by majorities; that accepted by the greatest number of operators interested and giving in their hands the greatest, most exact and lasting results is the arch with fixed anchorage bands, and if there is one fact resulting from a study of the data more prominent than another it is that every part possible to fix about fixed appliances should be carefully fixed with cement to exclusion of fermenting and retained food, and arches and ligatures

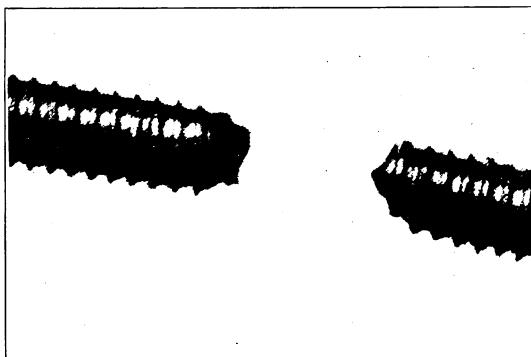


FIG. 13.

Fig. 13—Brittle fracture without reduction of German silver threaded arch under a load of 74.8 kilograms.

should be removable for frequent cleansing. Note the damage to the teeth under Class I, Division "A," and Class II, Division "C."

There exists an astonishing lack of exact data in our literature as to the alloys daily exposed in the trying mouth environment and we find little of real worth as to the physical characteristics of the metals—all alloys—which are used in orthodontia. For instance, German or nickel silver in very general use, originating long ago in China as *packfong*, composed almost entirely of nickel, may be now almost anything, provided it contains copper, nickel and zinc, so different are the given formulae.

After much correspondence to discover what we were really using, it was decided to have assayed chemically the appliances as sold in the open market. Five of different grades of rigidity were selected and for fear of change that acid or heat might make they were filed and buffed free of all soldered attachments and gold plating.

## German Silver Assay.

	Copper	Zinc	Nickel	Tin	Iron	Reduced by 10					
						Cu.	Zn.	Ni.	Sn.	Fe.	
B. Very soft retaining wire.....	61.8	25.9	12.1	...	.2	6.18	2.59	1.21	...	.02	
C. Medium Retraction Arch.....	59.1	20.2	20.7	...	...	5.91	2.02	2.07	...	...	
D. Rigid Expansion Arch.....	65.0	21.1	13.5	...	.4	6.5	2.11	1.35	...	.04	
E. No. 1 Molar Anchorage Band.....	58.4	23.2	18.4	...	...	5.84	2.32	1.84	...	...	
F. No. 2 Molar Anchorage Band.....	60.8	18.4	20.6	trace	.2	6.08	1.84	2.06	Tr.	.02	
						5)	30.51	10.87	8.53	3)	.08
							6.10	2.17	1.70	...	.026

NOTE—The trace of Tin is no doubt due to the fact that all solder was not removed.

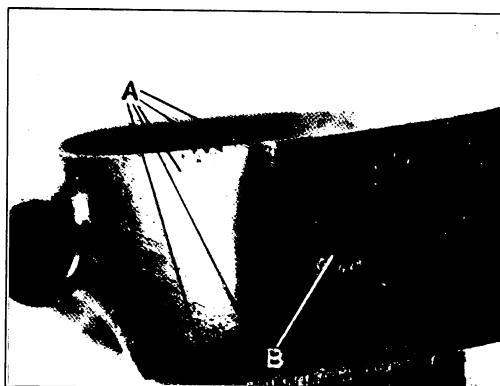


FIG. 14.

Fig. 14.—Platinous coin-gold anchorage band, four-months' wear showing no corrosion and little staining. (a) Plier and file marks; (b) salivary calculus.

The first fact of consequence in the assay is that the formula has little to do with the variety of physical characteristics found in the alloy; for instance, iron is not an impurity, but is added to give rigidity and color. Nickel, also, adds rigidity and yet we find nickel 1.2 and iron .02 in the soft retaining wire "B" and only nickel 1.5 and iron .04 in the rigid expansion arch "D" with copper the same. Such rigidity and hardness as these alloys possess is therefore obtained only by physical treatment, *i. e.*, drawing into wires from higher gauges or rolling into plates (Fig. 13); the heat of soldering will reduce all rigidity and flexibility so obtained to the normal alloy which as here assayed is soft and ductile.

It is difficult to understand how high fusing metals such as nickel, copper and iron are ever fused to alloy with volatile metals like zinc without complete destruction of the zinc.

We are told that brass is made first and then nickel added; the proportion of nickel in the composite formula is nickel only 1.7, to copper 6.10 and zinc 2.1. This is good brass stiffened by nickel. It may be not unlike the alloying of platinum and gold where the finely divided platinum, protected by the melting gold from an oxyhydrogen heat which volatilizes gold before the platinum melts in cooling settles to the bottom of the crucible.



FIG. 15.

Fig. 15.—Palatal surface of upper temporary molar covered by coin-gold anchorage band, screw retention, no cementing needed, for five weeks; experiment by Dr. F. C. Kemple. Note the peculiar pitch of band on disto-palatal cusp; no corrosion of band; decalcification of tooth under band at (a); dark spots are plier marks.

The making of these alloys needs further elucidation.

That German silver is a perfectly homogeneous alloy is shown by the large quantity used in the manufacture of very exact electrical resistances, and yet the zinc may be dissolved out of it just as all of the silver may be recovered from gold alloyed with silver in gold reduction.

To obtain practical physical laboratory tests of

**Sorts of Metals.** the different metals now in use for arch bars it was decided to have made five arches as nearly alike as possible (No. 16, Brown & Sharp gauge, thicker by about 3.45 m.m.

ITEMS OF INTEREST

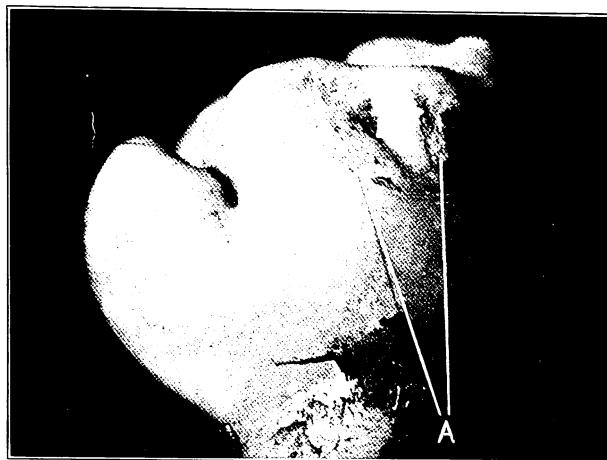


FIG. 16.

Fig. 16.—Palatal surface of upper temporary molar shown banded in Fig. 15. Spots of enamel decalcification at (a) produced at this unusual location by retention center produced by gold band. See section cut at (a) in Fig. 18.



FIG. 17.

Fig. 17.—After Noyes, *Dental Review*, October, 1908—"A Presentation of Some Conditions of Caries of the Enamel." Initial caries at (a) compare with Fig. 18.

than those in the market, nuts bored out of solid metal, all threads from same plate) of the following alloys: Platinum and iridium; "X," 20 k., platinous gold; "Z," 20 k., platinous gold; "Y," German silver arch; "W," German silver arch; and 14 k. nickel "spring" gold.

These were submitted to the National Bureau of Standards for tests in ductility, tenacity, hardness, flexibility, rigidity and strength of threads. Comparative tenacity, ductility, hardness and strength of threads were practically brought out in a tension machine by removing one nut and pulling the other against a grip with a hole in it just large enough to allow the arch bar to pass through and noting microscopically the behavior of the threads stripped and the bar in fracture, etc.; if the threads stripped, it was too soft; if it fractured in a sharp line it was too brittle, and if it reduced finally under a heavy load and fractured, it had sufficient ductility, tenacity and hardness. The tests for flexibility or elasticity and rigidity were made by mounting arch bars in a vertical plane; one end of the bar open as for use was set in a fixed clip; the other received the load and a needle on a scale noted the degree of deflection in the ends. Those moving a short distance and resisting the load were too rigid; vice versa, those moving too great a distance were too flexible. An interesting feature was "tiring" of some alloys under increased load.

**Report of Tests.** Weight of load 200 grams, to which 100 grams were added until 700 grams were reached. Extreme deflection of needle, the distance between the ends of bars 50 m.m.

	Grams	m.m.
A	200 moved	5.3
B	300 "	3.0
C	400 "	2.5
D	500 "	3.2
E	600 "	3.0
F	700 "	2.5
Under load	<hr/>	
of 700 grs.	19.5 m.m.	
in total of 50 m.m.		

*Platinum and iridium bar and nut of the same.*—Alloy said to be ten per cent. iridium; from what can be gathered this is a natural alloy, the platinum occurring quite brittle native with ten per cent. iridium.

Nut stripped thread slightly; the bar reduced in gauge to taper and parted in the roots of threads under the load of 102.5 kilograms. (Fig. II.)

Rigidity excellent (note B, D, F and total 19.5); tenacity, hardness good; ductility and flexibility fair; does not tire under load (note C and E); does not corrode; stands platinized gold solders; good color.

ITEMS OF INTEREST

	Grams	m.m.
A	200 moved	6.7
B	300 "	6.5
C	400 "	6.8
D	500 "	7.0
E	600 "	2.0
F	700 "	2.2
Under load	—	
	of 700 grs.	31.2 m.m.
	in total of	50 m.m.

"X," 20 k. platinous gold, bar and nuts of the same.—Alloy, approximately gold and platinum 20 pts., silver and copper 4 pts., more copper than silver. Impossible to find how this alloy is made; very homogeneous.

Threads on bar and nut stripped under load of 99.6 kilograms.

Rigidity good (note B, D, F and total 31.2); tenacity and hardness good; ductility very good; flexibility excellent; note A, C and D does not tire under load (note E and F); does not corrode; stands 22 k. gold solder; good color.

	Grams	m.m.
A	200 moved	5.8
B	300 "	6.4
C	400 "	9.6
D	500 "	5.4
E	600 "	3.3
F	700 "	1.8
Under load	—	
	of 700 grs.	32.3 m.m.
	in total of	50 m.m.

Clasp or spring gold, "Z" 20 k. platinous gold bar, nut of 14 k. nickel gold.—Alloy approximately gold and platinum 20 pts.; silver and copper 4; equal parts.

Bar broke in the root of thread without stripping under a load of 100 kilograms. (Fig. 12.)

Rigidity fair (note A, C, D and total 32.3); tenacity poor; hardness good; ductility poor; flexibility good; (note A, C and D), tires more than preceding under load (note E, D, C); does not corrode; stands 22 k. gold solder; good color.

	Grams	m.m.
A	200 moved	5.8
B	300 "	5.7
C	400 "	4.3
D	500 "	4.2
E	600 "	4.2
F	700 "	1.3
Under load	—	
	of 700 grs.	25.5 m.m.
	in total of	50 m.m.

"Y" German silver bar and nuts made from commercial German silver.—Alloy approximately copper 6.1, zinc 2.1, nickel 1.7, iron .02.

Bar broke in the root of thread under load of 101 kilograms with sharp brittle fracture.

Rigidity fair (note A, C, E); tenacity poor; hardness good; ductility poor; flexibility fair; does not tire under load (note B, D, F); corrodes; more gold plated than plain; stands 18 k. gold solder, but becomes soft; color bad, plain or gold-plated.

	<i>Grams</i>	<i>m.m.</i>
A	200 moved	8.0
B	300 "	5.7
C	400 "	7.6
D	500 "	5.0
E	600 "	5.4
F	700 "	6.6
Under load	—	
	of 700 grs.	38.3 m.m.
	in total of	50 m.m.

"W" gold plated, German silver bar and nuts as manufactured; nuts presumably made from tubing.—Alloy approximately copper 6.1 zinc 2.1, nickel 1.7, iron .02.

Arch bar broke in root of thread under load of 74.8 kilograms with no reduction of area, but a sharp fracture.\* (Fig. 13.)

Rigidity poor (note A, C and F); tenacity poor; hardness good; ductility poor; flexibility good; tires under load (note A, E, F); corrodes more gold plated than unplated; stands 18 k. gold solder, but becomes soft; color bad, plain or gold-plated.

14 k. nickel spring gold, bar and nuts of same, gold plated.—Alloy approximately gold 14 pts., copper, silver and nickel, making up the 10 pts.; proportions unknown.

Nut stripped of threads and pulled off at 68 kilograms; arch not damaged. Rigidity very poor (note A, C, D and F); tenacity fair; hardness very poor; ductility excellent; flexibility poor; tires completely under load (note A, C, D and F); solder with 18 k. gold solder, getting somewhat softer; color good; does not corrode when plated nor lose gold plating except from abrasion.

	<i>Grams</i>	<i>m.m.</i>
A	200 moved	10.7
B	300 "	8.5
C	400 "	4.1
D	500 "	6.4
E	600 "	4.5
F	700 "	15.8
Under load	—	
	of 700 grs.	50.0 m.m.
	total possible deflection	

It will be noted at a glance that the 20 k. platinous gold, without zinc in alloy, measures up best to all of the requirements for expansion and contraction arches. Platinum and iridium and the platinous golds are sufficiently rigid for retainer bars. German silver, in fact all of these alloys are sufficiently strong for any work required in the mouth.

To settle the much discussed question as to the relative wearing values of hard nuts on softer arches or vice versa, or nuts and arches of the same material, a nut of 20 k. platinous spring gold ("Z" in the list) softer than the platinum and iridium arch was run on it and stripped in the threads of the nut under a load of 95 kilograms.

\*It is significant that the wire of both of these bars fractured under the load indicating that flexibility and rigidity were induced by previous physical treatment, sharp fractures such as these could never occur in an alloy of copper 6, zinc 2, nickel 1, unless its molecules were strained by the draw plate. (Fig. 13.)

A platinum and iridium nut harder than the arch was run on "X" 20 k. platinous gold and stripped the threads of the bar at load of 35 kilograms.

If these figures be compared with the load necessary to strip the platinum and iridium nut, bar of same we have:

Arch platinum and iridium, nut same .....	102.5 kilograms
Arch platinum and iridium, nut softer .....	95.0 kilograms
Arch 20 k. platinous gold, nut harder.....	35.0 kilograms

These results are what might be expected, and indicate that bolts and nuts for anchorage bands, which meet more stress than nuts on arches,

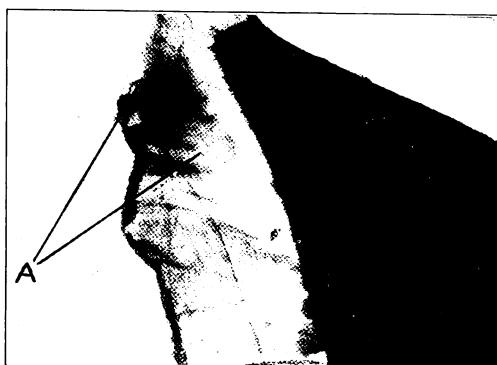


FIG. 18.

Fig. 18.—Slide of slow enamel decalcification cut, at (a), Fig. 16. Enamel rods intact, complete loss of cementing substance at (a), compare with Fig. 17.

should be of the same metal. Further, according to Seller's law, there is a direct relation between size of nut and the thread on arch (Seller's threads are those in use in orthodontia), nothing is gained in holding power or strength by having the nut any longer than the diameter of the bar plus one-third, unless such depth is for retention in a tube, as in connection with arches.

The study of quite a number of used anchorage **Anchor Bands.** bands with the lens where the band was made of coin gold (gold 90 per cent., copper 10 per cent) and platinous coin gold (coin  $21\frac{1}{2}$  parts, platinum  $2\frac{1}{2}$  parts) show most excellent results in wear and no corrosion; the bolts on these bands made of "X" 20 k. platinous gold with small nuts stood the stress of use well. (Figs. 14 and 15.)

**Ligatures.**

The question of the best materials for ligatures is the weakest point in this paper, and no suggestions can be offered except that some alloy of gold be found to serve the purpose; the brass now in use stretches and breaks down quickly from corrosion, and is not to be thought of. (Fig. 7.) Silk and linen thread collect filth and set up gingival irritation.

**Damage to Teeth.**

The embarrassing question of damage direct or indirect to the teeth by presence of orthodontia appliances is one of the most important in this connection. It has been noted that not infrequently

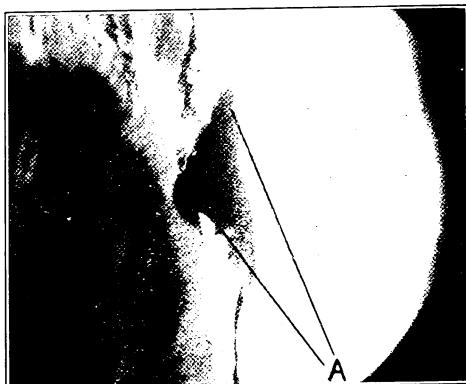


FIG. 19.

Fig. 19.—Control experiment; rapid initial caries with decalcification of both rods and cementing substance under an uncemented band, removed, not cleansed, examined and replaced every month; (a) did not occur until the third month.

white lines and spots, sometimes stained black or brown, appear about or under bands and arch bars. The causes have been mentioned, and there remains to be determined the kind of acids having found the source of such.

Notwithstanding the numerous theories advanced as to the causation of dental caries, the researches of Miller, made thirty years ago, stands unassailed. Lactic acid principally, with acetic, butyric and valerianic acids in small quantity, the product of fermentation in the human mouth, produced by bacteria in a carbohydrate media, are the primary factors in decalcifying the enamel initial to caries. According to Noyes (*A Presentation of Some Conditions of Caries of Enamel*, "Dental Review," October, 1908) decalcification of enamel is to be divided

into two distinct phenomena, differing only with the degree of acid formed. *First*, the rapid destruction of both rods and the inorganic matrix cementing such, due to intense acid and producing a well marked cavity (Fig. 19) and, *second*, the more slow, but just as serious, solution of the inter rod substance, due to more dilute solution of the same acids, the rods appearing in this instance in well ground slides "like a picket fence," interfering with the coefficient of refraction and

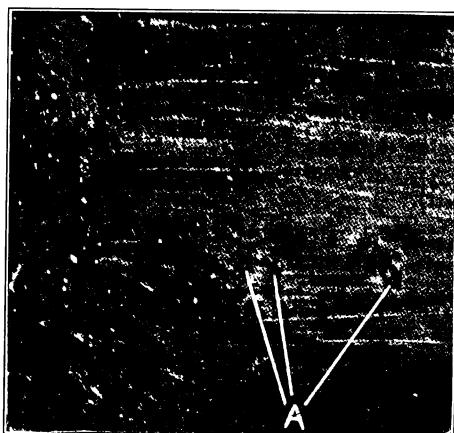


FIG. 20.

Fig. 20.—Section of German silver gold-plated anchorage band just as purchased; (a) gold-plating lost, spots showing red and green salts. The auto-chromatic slide gives these colors perfectly, but it is impossible to produce them in print.

presenting in white lines and spots (Figs. 17 and 18). These enamel trauma often appear to the unaided eye like the histopathological spots in newly formed enamel, referring to which the same author says, "In the white spots in enamel there is more or less complete failure in formation of the cement substance, but perfect rod formation."

It is with the second of these conditions that the orthodontist has most to do, as he often induces it by the continued presence of appliances adjacent to tooth structure.

The assertion frequently made and backed by a long line of clinical evidence, that there occurs deeper and much more rapid decalcification of enamel in teeth surrounded by bands of noble metals, particularly platinum and iridium, as compared with German silver, was established by the following experiment.

On two upper temporary molars in the same mouth (having slight carious cavities approximately—it being next to impossible to obtain others in the mouth for experiment) were set without cement, by Dr. F. C. Kemple of this Society, an anchor band of German silver on the right and of coin gold on the left, August 15, 1908; the teeth were extracted and examined September 29, 1908. (Figs. 15 and 16.) The molar on which the German silver band was placed was stained at points

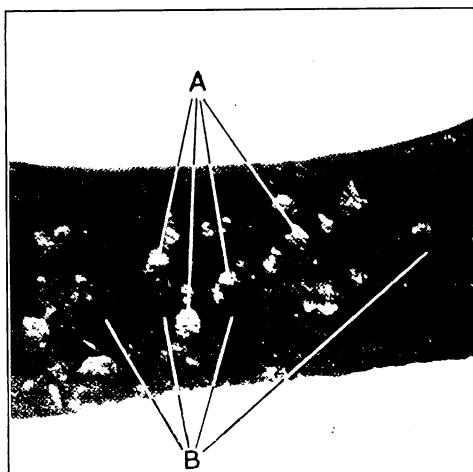


FIG. 21.

Fig. 21.—Tooth surface of gold-plated anchorage band, buccal section, showing white amorphous flower salts at the edge of crater (a); dark crater at (b).

wherever the band touched it; these stains easily removed, were collected, and together with others analyzed later; the tooth was carefully examined at those parts, farthest from where the band surrounded the carious cavity and found to be very little damaged. The molar bearing the gold band was treated in the same way, no dark stains were noted, but at a point most distant from the cavity of decay (the band had worked up until it covered the disto-palatal cusp—a point unusual for enamel decalcification), a series of white lines were found (Fig. 16); this tooth was honed to section and is presented herewith, showing decalcification of the inter-rod substance (Fig. 18) like the early caries shown in the slide from Noyes (*Ibid.*) (Fig. 17).

Another slide cut from a temporary molar set and watched by the writer shows caries from four months wear of a loose German silver

band; there is a true caries of the first form mentioned; the band was removed once a month (and replaced not cleaned) and tooth examined. The cavity is of recent and rapid origin (Fig. 19).

Some effort was made to induce these conditions by cultures out of the mouth; a perfectly sound molar on which was set a gold plated German silver anchor band was exposed for two weeks in a culture of *B. acidi lactici*, in Witte's pepton and glucose with the proper degree of alkalinity maintained, necessary for such. This tooth was carefully examined before and after placing in the media with no appreciable result, except on the band as will be noted later. The technique may have been defective, or time of exposure short, in this test.

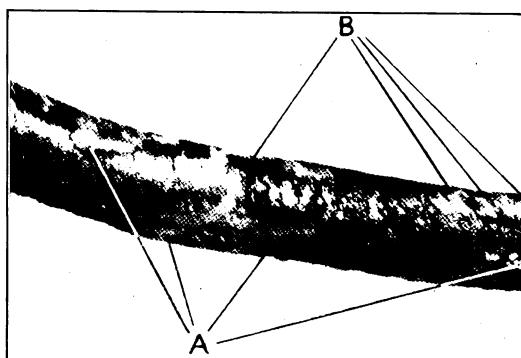


FIG. 22.

Fig. 22.—Lower gold-plated German silver arch, showing deposits of green salivary calculus at (a); deep crater of corrosion at (b). Much better shown in autochromatic slide.

The rapid enamel decalcification occurring clinically and confirmed by experiment under the noble metals as compared with German silver is highly significant; further, it is to be accepted as the normal in the human mouth, as proven by the even more rapid and complete carious degeneration of abutment teeth under one end of a fixed bridge, loose for a few weeks; the complete carious cavity as noted in the latter stages of the wearing of the German silver band and produced by violent acidity (Figs. 18 and 19), is of import and convincing, showing a first deterrent action by the German silver band developed early in its placement which later it lost, allowing rapid caries to begin.

The solution of this problem is to be found in the study of the corrosion of German silver appliances, plated and unplated, in the mouth,

which is most interesting. A reference to the tabulation given in this paper will show that those portions of appliances exposed to the inorganic acids formed in retention centers they create are attacked like the teeth in such centers (Figs. 4 and 7); after a longer time, however, *and unlike the teeth the whole appliance shows corrosion even on parts which are always kept clean, as the labial surfaces of arches* (Figs. 5, 2 and 8).

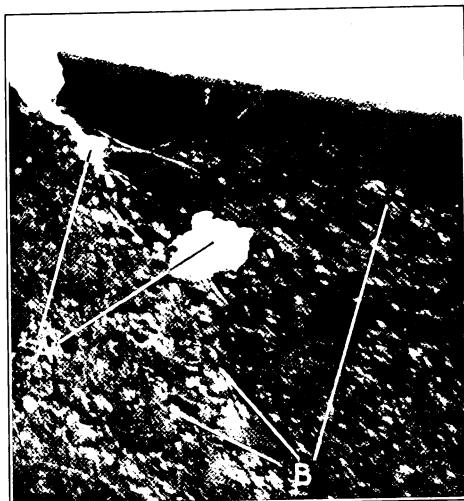


FIG. 23.

Fig. 23.—Tooth side of palatal section of gold-plated German silver anchorage band worn uncemented for nine weeks. Showing electrolysis to perforation at (a); deep craters, almost perforating, at (b).

This is to be noted because it shows some other agency at work than acids, or presupposes a general mouth acidity almost as high as that of the retention center, where the acid is generated, "nascent," so to speak.

A study of the appearance of salts of discoloration existing on used arches and bands to the number of nearly four hundred has been made, and chemical analysis had as follows:

Corroded German silver shows deep craters of what appears to be pure metal, brilliant, crystalline, as freshly fractured as zinc (Figs. 1, 5 and 23).

Surrounding such craters when first found are amorphous flower-like white salts, rather rare and very difficult to collect (Fig. 21). These have not the consistency of salivary calculus, which is hard, well organ-

ized and regularly crystallized in deposit, occurs freely and is not infrequently stained from an apple-green to a greenish blue (Fig. 22). All other and older corroded surfaces are covered with dark salts, in hue from a copper through the browns down to a bluish black and black; these are more constant on the parts of the bar first attacked, but on long exposure become general. Further, when gold plating occurs (and it seems to be impossible to electroplate German silver, defective spots occur where the gold rolls up and drops off) (Fig. 20) this disintegration is very much more rapid and violent (compare Figs. 1, 5 and 23 with Figs. 2 and 3). (Noted by V. E. Barnes, *Orthodontia Materials, Dentists' Magazine*, May

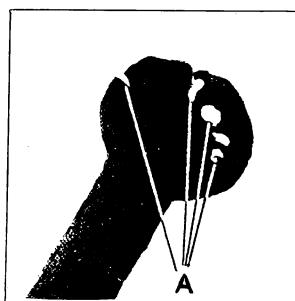


FIG. 24.

Fig. 24.—Reduced view of head of a 12-inch galvanized (zinc) iron bolt taken from the copper-sheathed hull of a ship. The threaded end was nutted to the iron hull and exposed to the air; the head (here shown) was exposed to what sea water—a good electrolyte—could filter through the wooden plug lying directly against the copper sheathing. These conditions are ideal for electrolysis; quiet dripping of sea water leading from copper via galvanized iron surface to the iron hull. The whole bolt caliber is greatly reduced, honeycombed in craters, as at (a)—such as could not have been produced by oxidation.

2, 1908.) Working under the hypothesis that the inorganic acids alone produced corrosion, from the whole lot of appliances, together with teeth stained by same, after a great deal of trouble there was collected a few milligrams each of the white amorphous salts and the dark stains, commonly called oxids; these were submitted for chemical analysis. The dark salts proved to be insoluble sulphids of copper and nickel, not germicidal in the least.

The sulpho cyanates are to be considered in this connection. In a communication from Dr. J. Wright Beach, who has done work in this line, he states that, while the normal saliva of children under sixteen contains sulphocyanates, in his opinion it would not be in sufficient quantity



to damage German silver. Dr. H. D. Pullen (*President's Address, Society of Orthodontists, ITEMS OF INTEREST*, January, 1908) says that potassium sulphocyanate very badly discolors German silver; tests made out of the mouth (always to be doubted) show sulphid discoloration, but little or no corrosion of German silver. In the culture tests of gold plated German silver (reported later) those parts of the appliance exposed to the air of the tube, and all silver soldered joints, show under the microscope an array of multi-colored salts. These were, undoubtedly, produced by hydrogen sulphid from decomposing nitrogenous matter in the culture. Mendeleff (*Principles of Chemistry*) describes hydrogen sulphid as acting almost as violently as an acid: "the light metals, and copper and silver evolve hydrogen when in contact with hydrogen sulphid in the air, producing dark metallic sulphids, as from silver near the skin." So it is more than likely that these sulphids are produced by the free hydrogen thrown off by the electrochemical corrosion of German silver, and being insoluble where deposited on the teeth and appliance, the sulphids of zinc, light and soluble, are probably broken up and ingested.

It has been asserted that these dark salts could in some germicidal way protect the etched enamel surfaces on which they were deposited. Even if the analysis did not show such salts to be sulphids, perfectly inert as bactericidal agents, the supposition is paradoxical, for if acids acted on German silver to produce germicidal salts in saturation sufficiently strong to reach the distant tooth and to protect it by deposition they would be self-limited, and by very virtue of their germicidal action delay or stop the growth of bacteria which produced the acids. Copper amalgam, and its aseptic action on carious dentine, has been used as an illustration in this connection. The cases are similar as to causes for breaking up of the copper, but dissimilar as to deposits of salts.

Dr. E. C. Kirk has explained that copper amalgam is made by depositing copper electrolytically into mercury; in its use oxids are formed, which existing in a mass with particles of pure copper, under the saliva as an electrolyte, and due to a difference in potential, local electrolysis is set up with a deposit of salts into the tubular dentine, the contact with which is practically adhesive consequently, the salts are protected in slowly depositing.

A band about a tooth is open in comparison to such a filling and is washed to dillution by the saliva; enamel is not porous and if the interrod substance be decalcified sufficiently to permit deposits of protective salts, the actual damage is done, which the salts are expected to prevent. Again, if these salts were sufficiently active to protect the teeth, the continued ingestion of such, even in the dilutions of the human mouth,

might be attended by serious consequences to the patient, and would be the best possible argument for not using any such metal.

The theory that these suphids are germicidal has been used against the application of gold-plated appliances and in favor of plain, reasoning that more salts would be formed from the plain appliances, hence, greater protection of the adjacent dental tissues. Just the reverse is true; gold plated German silver disintegrates much more violently and rapidly, forming more salts in the saliva than does plain (Figs. 2 and 5). What really happens is the frequent removal and buffing necessary for appearances, in the use of plain arches, disturbs the culture spots, preventing acid formation, and reducing the corrosion to such described in Class II., Division "C" (Fig. 8).

It is quite likely that the green stains in salivary calculus are the ordinary salts of nickel (apple-green) and copper (greenish-blue) formed very slowly in small quantity under the protection of the calculus and staining the whole mass. The white salts gave a strong reaction for phosphorus and proved to be phosphate of copper and zinc. This was disappointing, as it was expected that lactic acid acting on the metals would produce lactates, which, while known to be soluble, might give some signs of their presence.

**Examination of Saliva.** It was determined next to analyze samples of saliva of children wearing German silver appliances for some time and showing marked corrosion. A number of such samples were requested from mem-

bers of this society and five received, two other samples were collected; out of these seven only three were worth analysis, for this reason: It was found a very difficult thing to get the composite of several weeks' saliva, because children will not collect the 50 c. c. necessary to accurate analysis in small quantities daily, but insist on filling the bottle in a day or two. It is obvious that even with large masses of German silver in the mouth, under most active degeneration, the proportion of salts would be infinitesimal. The colloid substances in the saliva might easily, by protecting corroding surfaces, interfere for a day or two with the formation of salts, and the very act of drawing quantities of saliva from the mouth would "clean up" and interfere with the very process in which we are interested.

All of the samples submitted, together with the two obtained by the writer, were open to this objection. In two of these analyzed, furnished by Dr. Kemple, it was found later that the whole 75 c. c. had been collected in three hours, and, of course, absolutely no metallic salts were obtained. The spark spectra test for metals was also applied with a similar negative result.

The third, D. V. E. Barnes's specimen from a mouth, where plain German silver corroded badly—time of collection about three days—after very careful work gave a slight reaction for copper; not enough to be convincing.\*

With the idea of definitely settling the matter small cultures of *B. acidi lactici*, Witte's peptone, to which glucose and alkalinity sufficient was added, were prepared; in one was placed a gold plated German silver arch and in the other a 20k. platinous gold arch; the third contained a gold plated German silver "D" band, each one half exposed to the air of culture tube to get the action of any gases, if such were found. After two weeks these were carefully examined microscopically with no other effect than the action of the hydrogen sulphid on the soldered portion of the "D" band, and sulphid staining on the gold plated German silver arch; the platinous gold was not disturbed nor discolored.

**Corrosion of German Silver.** The theory that acids alone corrode German silver in the mouth is defective; *first*, because no matter how long the exposure, the bar or band would suffer only, as a tooth does in the retention centers

(Fig. 4), while it is well known that after long exposure the whole bar corrodes, even in the clean spots (Fig. 5). We have no reason to expect a greater degree of acidity or a general acidity of saliva in a child using a bar four months than one month. General acidity of the saliva can come from defective metabolism, yet all the children wearing bars cannot so suffer, while the degeneration of German silver arches is remarkably constant as to primary and general corrosion in all children.

*Second*, a greater and more rapid enamel decalcification, hence, a greater degree of acidity has been noted and proven under noble metal (Kemple's experiment, Figs. 10 and 16) than under German silver bands, yet all things being equal, carbohydrate food retention, hence acidity, should be the same in each for the same mouth. So we have something in the presence of the German silver bands which either delays the formation of acids or breaks it up after being formed. *Third*, after continued application of the German silver band we have enamel decalcification like that occurring under noble metal bands, showing a pronounced diminution of the force preventing acidity (Fig. 19). *Fourth*, it will be noted from the tabulations that gold plated German silver disintegrates much more rapidly and violently than does plain German silver in the same mouth (compare Figs. 2 and 15), which should not be the case if acids were the only factors. The craters occurring first about the spots where plating is lost have the appearance of those found in the metals comprising the common wet electric cell (Figs. 1, 23 and 24).

\*It is suggested that this is committee work impossible to accomplish alone.

In discussing the electrochemical theory of decay advanced by Bridgman and Chase, W. D. Miller (*Micro-organism of the Human Mouth*, pages 137-141) gives an experiment with a zinc tooth filled with gold, exposed in an electrolyte (nearly all solutions, particularly of salts and acids, are electrolytes); the zinc tooth was rapidly decomposed because the whole zinc surface became electro-positive (the oxygen side) to the gold, which is electro-negative (the hydrogen side). *What is of greater import to us is that the electrolyte in which the tooth was exposed was also decomposed*; the basic portions appearing as ions, or groups of atoms. It is generally accepted that all substances in solution, except certain colloid materials exist, not as salts in water, but in a state of electrolytic dissociation; thus, in a solution of sodium chlorid the ions of the metal sodium are electro-positive to the ions of chlorin, which is electro-negative.

Referring to the table of Berzelieus of electro-positive and negative substances we find the metals appearing in plain and gold plated German silver, gold and copper high in the scale of electro-negative substances, zinc just as high in the electro-positive, with nickel very near it and distinctly positive to gold and copper. So any retention center between gold plated German silver and tooth becomes a little battery (Fig. 24), just so soon as the gold plating fails in spots (Fig. 20), and the acids are formed in sufficient quantity to attack the exposed metals (Fig. 4). That the action is violent the slides fully show (Figs. 1, 5 and 23), and it is limited respectively either by dilution of the acids by mouth fluids, by a coating formed by some of the colloid substances found in saliva, which are not electrolytically dissociative, or, what is most likely, complete electrolytic dissociation of the media and all contained in the retention center, delaying further bacterial growth, followed by the deposition of insoluble metallic sulphids on the corroding surface.

Relative to the action of dissociation as a bactericidal agent little has been written, but it is established that in passing light currents through culture tubes in testing electricity as a germicide electrolytic dissociation occurred in the culture making the media an electrolyte to the destruction of bacteria (Cohen and Mendelsohn, quoted by Sternberg's *Bacteriology*.)

The dissociated metals produced by electrolysis exist in solution in the saliva, as ions, and unite as suggested before, or are ingested as such.

The coatings of insoluble sulphids protect the fresh craters (Fig. 2), but in turn they become retention centers (Fig. 5) in which fresh cultures grow, fresh acids are formed, recharging the battery again; new spots are attacked to the ultimate electrolysis of all surfaces (Figs. 1, 23 and 24).

Miller (*Ibid.*) has shown that enamel is absolutely a non-conductor of electricity and can have no part in electrolysis, except that of passively suffering from the products of it. The rapid decalcification under noble metal bands is confirmative, for about such bands and bars there can be absolutely no electrolytic dissociation; so we have the retention centers under these noble metal bands undisturbed to the formation of cultures, which are not dissociated, as they are under German silver, and therefore produce rapid degeneration of the adjacent enamel (Figs. 15 and 16).

The platinum, iridium, gold, copper and silver entering into noble metal appliances are all practically electro-negative to each other; the enamel of the teeth is a non-conductor and all of the acid resulting from bacterial growth spends its force upon the tooth, while in German silver electrolysis occurs and the action is all along the line of the appliance.

It is also interesting to note that when very small portions of zinc exist as in the higher gold solders reduced with spelter or even in 20 k. platinous gold alloys (as shown in tabulation), electrolysis begins and corrossions exist; this is the greatest proof possible of the correctness of the theory of electrolysis of all appliances containing base metal.

It is possible to successfully gold plate these zinc alloyed golds, even in the lower karats of 14k. to 10k., giving freedom from electrolysis, except where abrasions expose the original metal.

A study of old bridges where German silver "dutchman" had been used and exposed in finishing will show electrolysis of the German silver, with craters cut just as in gold plated German silver.

The rapid degeneration and breakage of brass ligatures crossing platinous gold or gold plated German silver arches (Fig. 7) as compared with more lasting wear over plain German silver arches is due to electrolytic action.

All of the brass appliances examined except those in contact with noble metals or gold plating, such as ligature crossings showed less damage than did plain German silver (Fig. 103). This fact but confirms the idea of electrolysis; in brass we have but one electrolytic opposite each, viz., copper and zinc; in gold plated German silver; gold and copper opposed to nickel and zinc.

One of the most striking features of the inspection of many gold plated German silver anchorage bands is the immunity to corrosion that passage under the gingival line affords, all of the gold plating being intact under that line, a complete row of craters, just at it and loss of gold plating beyond it; to the writer's mind this is a confirmation of the idea that the gingival secretion is colloid to the prevention of electrolysis.

**Toxic Effects  
of Metal  
Appliances.**

The toxicology of the metals, copper, and zinc and nickel which go to make up German silver is worth consideration, but it cannot be elaborated sufficiently to be convincing. As zinc and nickel are very slowly absorbed via the gastro-intestinal tract, like copper, and as they form such a minor portion of German silver as to be almost a negligible quantity, they may be considered systemically under copper.

Cushny (*Pharmacology and Therapeutics*) says, when a solution of metallic salts comes in contact with mucous membrane of the mouth or stomach the albumen displaces the acid portion of the salt, forming an albuminate more or less stable. The major portion of a dose of metallic copper will pass through the gastro-intestinal tract unabsorbed unless there are abrasions or continued use of the remedy produces local ulceration in the mucosa. That absorbed passes directly into the blood according to Kobert, attaching itself to the red blood corpuscle at once. Taken by the mouth it does not produce poisoning, because it is so slowly absorbed and is withdrawn rapidly from the blood by the liver.

Ryan (*Copper in Human Liver*, University of Pennsylvania, *Medical Bulletin*, June, 1907) found it constant in the liver not as normal, but accidental, derived from copper-bearing foodstuffs, many vegetables and oysters containing copper.

Slowtzoff claims it forms stable albumen compounds, such as the nucleinate in the liver, and because of their stability it is excreted slowly. In copper and brass workers, acute febrile gastro-intestinal catarrh, nausea, vomiting or colic and diarrhea, followed by paralysis, with green discoloration of the skin occur. "Brass founders ague" is rare and due to inhalation of gases in casting, but anemia even to chlorosis is common with enlarged salivary glands. In toxic doses the central nervous system and the kidneys, by which it is excreted, are involved, particularly after long ingestion. It is apparent that the only danger in the use of German silver in the mouth is from the continued ingestion of its disintegration products.

This is precisely what happens in orthodontia; the average quantity of German silver exposed to mouth fluid is as follows:

Grains	Whole tie-up
One anchorage band weighs....11.39	Four bands weigh...45.56
One arch cut to suit weighs....19.40	Two arches weigh...38.80
One average ligature weights... .616	Ten ligatures weigh. 6.16

Total weight of "tie-up"....90.52

A gold-plated German silver arch used about a month, and of average corrosion, showed a loss of one-ninth by weight when balanced with a new one of similar measurement, micrometer scale,\* the total weight of a full "tie-up" is ninety grains, thus giving a monthly dosage of ten grains of metal; from the writer's study of used appliances the second month's corrosion should be in greater ratio than the first, and unquestionably there can be found many cases of children wearing German silver appliances with slight symptoms of metallic poisoning.

Of two cases of alternate constipation and diarrhea, accompanied by colic, and one case of chlorosis in an adult the writer is personally cognizant; on the removal of the appliances, *at the physician's suggestion*, the cases cleared up. Two other cases, one of anemia and one of enlarged submaxillary glands, the writer has on good authority, both recovering on removal of appliances. These could hardly all be coincidence, and it would not be well to state before this audience that such were caused by malnutrition due to crippling mastication by the orthodontic appliances.

The fact that there are comparatively few cases of metallic poisoning in children wearing masses of German silver and soft solder in connection with gold in the mouth for long periods, may be explained not on the basis of the chemical corrosion of the metals, with daily ingestion of salts formed, for if such were the case, symptoms of metal poisoning would be the rule rather than the exception, but rather on that of electrolytic dissociation producing the ions of these metals and salts, that the daily dosage is of metallic copper, nickel and zinc, which it has been shown are slowly absorbed.

May we not now raise the question of just how seriously we shall be taken as a profession which in one breath plumes itself on mouth prophylaxis and in the next preaches the continued use in the same mouth of so filthy a thing as corroded German silver?

What of our status with our medical confreres called by the laity when systemic conditions in our little patients demand a consultation, if the removal of such appliances (ordered by them) and the clearing up of the symptoms are so closely associated as cause and effect?

Dr. Pullen (*Ibid.*) quoting a goldsmith, says, "Gold is a metal capable of alloying in so many different ways that it is possible to at least duplicate if not excel any of the qualities possessed by the alloy German silver."

The foregoing statement, in the humble opinion of the writer, has been more than verified in the paper (compare Figs. 5 and 6 with Figs.

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\* The defects in this comparison are known to the writer but it was all possible in the time available.



## ITEMS OF INTEREST

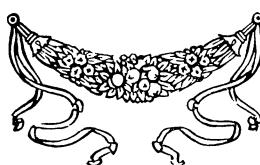
14 and 1), German silver by every count has been proven unfit for use in the mouth, and the mystery is, why we have used it so long.

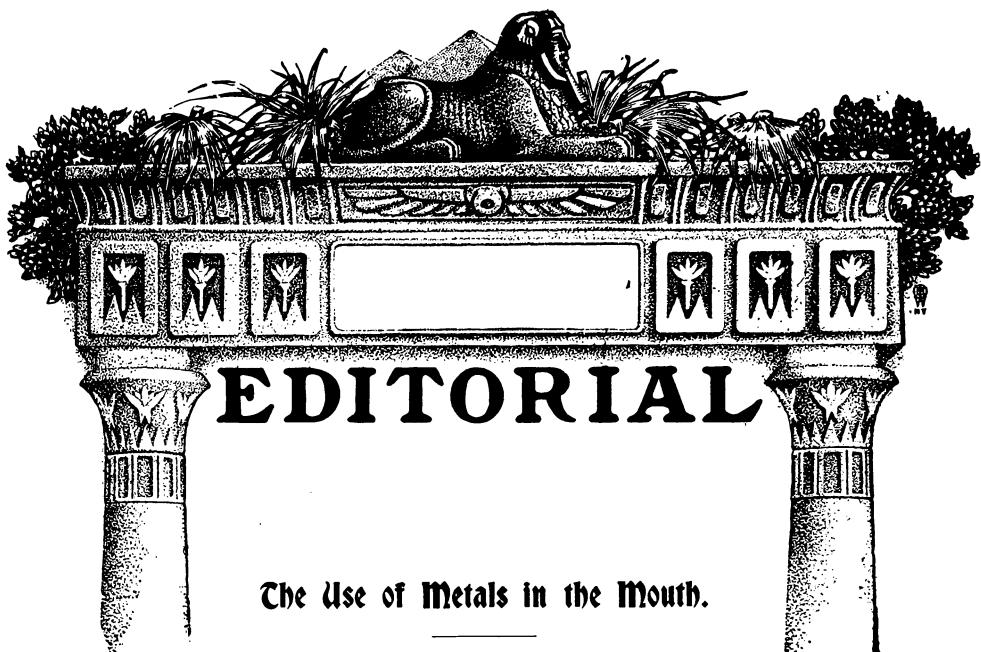
It has never been a question of expense, we are sure, the cost of an appliance is in direct ratio to the labor, not the material consumed in its manufacture. Twenty karat platinous gold appliances cost but one quarter more than gold plated German silver appliances, and they may be then cashed at one-half on the original cost, or boiled, altered, polished and used many times again. Who would think for an instant of using a German silver arch a second time?

If the use of noble metal appliances becomes general the orthodontist will be compelled to see his patient more frequently than heretofore, and completely removing all arches and retainer bars (which, if possible, should be made removable without disturbing cemented anchorage), give careful prophylactic treatment at least once every two weeks, for while cement will protect teeth about and under bands, the tooth contact points along the line of arch and ligatures will do greater harm to the enamel than German silver if not so disturbed.

The sentiment of our beloved profession as to materials has always been of the very highest type, one of which we might justly be proud; "the best" has ever been "none too good," and we are sure that this society will subscribe again to it in the words of Dr. C. N. Johnson, slightly transcribed, who said recently: "Nothing yet devised by the ingenuity of man, or even distilled in the great alchemy of nature, is quite good enough to go into a human tooth (mouth)."

The writer wishes herewith to make all due acknowledgment of help had in mouth experiments to the members of this society; for physical tests to the National Bureau of Standards; for analysis and assays to Professor M. R. Schmidt, of the Johns Hopkins University, Department of Chemistry; for Bacteriology, to Dr. Clausses, Johns Hopkins Medical School.





## EDITORIAL

### The Use of Metals in the Mouth.

A great deal of space is allotted in this issue to a paper from the pen of Dr. Clarence J. Grieves, which, though appearing in the department of orthodontia, having been read before the American Society of Orthodontists, is of equal importance to both the prosthodontist and to the general practitioner. We are proud of the privilege of presenting this magnificent paper to the consideration of the more thoughtful and progressive men in dentistry, believing that it will well repay the close study of all truly professional men who have the welfare of their patients at heart.

Dr. Grieves is practically the first to make a scientific investigation of assertions, claims and beliefs, which in the past have been promulgated with no real proof of their truth.

For many years ready-made regulating devices have been on sale in dental depots, constructed of "German silver." It has been claimed that "German silver" is better for this purpose than any of the noble metals; that used in the mouth it "throws down" metallic salts which are germicidal, and, therefore, preventive of caries, and that for this reason the cementation of molar bands is unnecessary. The filthy appearance



of such appliances in many mouths has been freely admitted, but considered of no consequence, because of the aforementioned advantages (?) of German silver.

Another contingent denied the immunizing activities of German silver, and, because of its filthiness, declared in favor of the noble metals as equally safe, equally efficacious and far more cleanly and durable.

The latter evidently forgot the common experience of the prosthodontist, that a tooth embraced by a gold clasp, in the majority of instances, suffers from rapid caries. Years ago Bonwill gave to the dental world a clasp so constructed as to touch the tooth at but three points, declaring that it would prove equally efficacious as a clasp, and far less dangerous to the tooth. The contention of Bonwill is more than borne out by the investigations of Grieves, and the warning against too close adaptation of metal to tooth surface is most opportune just now, when skilled prosthodontists are exhibiting with pride beautifully adapted prosthetic bases, wherein saddles and clasps are all cast in one piece. After studying this paper by Dr. Grieves it will be seen to be wiser either to make the clasps separately, or else to take precautions against the too close adaption of the cast-gold clasp.

The paper is of especial interest to the general practitioner, because in recommending one of his little patients to a specialist in orthodontia, it warns him to make sure that he choose one whose habit it is to keep one eye upon the enamel surfaces of the teeth, rather than to have both eyes riveted upon the mere movement thereof. Orthodontia has been declared to be, and is, a great prophylactic measure. But the practice must be so conducted that the teeth shall not suffer from enamel disintegration, which is practically invited by the appliances.

Contrary to the claims of some, immunity is not achieved by the use of any particular metal, although Dr. Grieves finds that enamel disintegration is more prone to occur in connection with the noble metals. As an explanation of this he advances the theory that electrolysis is less active with the noble metals, and to electrolysis he attributes some deterrent action against caries by dissociating the culture, making the medium an electrolyte to the destruction of the bacteria.

Perhaps the most important lesson to be learned from the researches of Grieves is contained in this statement: "Nothing is safe near a dental



surface, unless so near as to exclude saliva, or so open as to allow acid dilution by saliva, or as to be removed and cleansed."

The writer has, he thinks, in two ways benefited by this lesson. The warning of Dr. Grieves is against establishing and long maintaining contact between tooth surface and regulating device, such contact providing retention centers for media which invite the growth of bacteria. Dr. Grieves also tells us that a properly cemented molar band protects the tooth, regardless of what metal may be used. *The logical moral is to use more bands about teeth and to cement them on.*

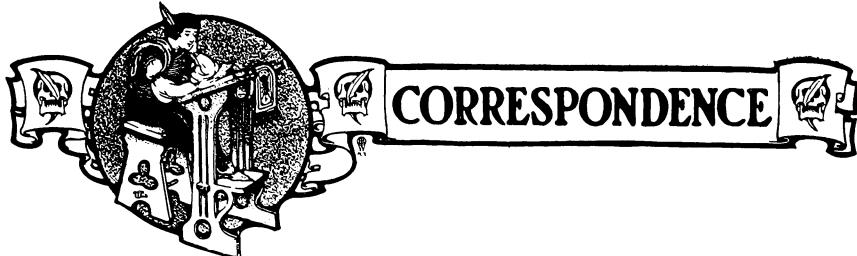
Since the introduction of the traction silks for ligatures, many have found it possible to rotate teeth with looped silk ligatures without resorting to bands, as was done when using brass ligatures. Evidently it is safer to band all teeth which must be rotated, and in connection with such bands the silk ligature is no longer a danger. Another point worth considering is, that in ordinary movements of teeth, the silk ligature may be used to advantage in the following manner: As the silk ligature shrinks, thus maintaining its tension, it is advisable in ligating to be careful *not to bring the metallic arch into actual contact with the enamel* of the tooth ligated. In this way a tooth may be moved quite as well, while permitting a "wash" of the saliva, such as Dr. Grieves recommends.

In some mouths caries is more active than in others. In two cases of this character, since hearing Dr. Grieves's paper, the writer found a number of teeth already showing enameled calcification from appliances used by a previous practitioner (German silver).

These already infected teeth were thoroughly safeguarded, and handled satisfactorily by "protective banding." The teeth, being in quite crowded arches, and the resort to bands being solely for protective purposes, the bands were made of *pure platinum* about four-one-thousandths thick. The ductility of the pure platinum, and the thinness of the bands, allowed very close burnishing during the setting of the cement. With careful manipulation even thinner platinum may be used, and would, of course, serve equally well as a protection at the points of necessary contact with arch and ligatures.

Dr. Grieves's summing up in regard to German silver is certainly impressive. He says:

"German silver by every count has been proven unfit for use in the mouth, and the mystery is why we have used it so long."



## Something More, and Important, About Dr. Taggart and the Dental Profession.

### Editor ITEMS OF INTEREST:

To the older men of Illinois, who for thirty years have been witnesses of Dr. Taggart's readiness to make his professional brethren acquainted with everything he knew and everything he could do, the present antagonism between him and the profession seems very deplorable, and every possible effort should be made to bring about agreement and cooperation instead of antagonism. There has been considerable complaint and criticism of Dr. Taggart, much of it by men who have not bought his machines and have no claim upon him; we are at present more concerned with the attitude and the duty of the profession toward him. There is essential and important misunderstanding by the profession generally as to Dr. Taggart's attitude, intentions and efforts, as expressed in the suit he has brought for the protection of his patents. This will be best shown by a brief account of the facts, the principles and the duties relating to the subject.

**Patents and the Code of Ethics.** First, as to patents: The dental code of ethics has nothing to say about patents either directly or by implication. "The Principles of Medical Ethics" is explicit and sweeping, in a short clause as follows:

"It is equally derogatory to professional character for physicians to hold patents for any surgical instruments or medicines." The attitude of the dental profession is that of tolerance, probably approval, of the patenting of such things as can be made and sold in the open market by the makers or the supply houses. This is evident from the fact that many men holding such patents have never had their membership or standing in dental societies called in question. The profession has shown, and rightly, as I believe, an uncompromising dislike and opposition to such patents as can only be enforced or protected by the collection of an annual office license or of royalties on the operations performed. These are sometimes

called "process patents." This opposition is very little, if at all, on account of any unwillingness that one who gives to the profession some valuable new process or operation should be suitably rewarded financially. It is chiefly on three grounds: First, because the exactions are likely to be extortionate, as was the case by the Dental Vulcanite Co., and attempted by the Crown & Bridge Co.; second, because the manner of collection is vexatious and irritating; third, and perhaps most justly, because the larger part of the money collected is likely to go to people outside the profession, who have conferred no benefit upon us and to whom we are under no moral obligation. In the case of the Vulcanite Co. this happened as to the whole amount collected.

Dr. Taggart's attitude and intentions in these **Dr. Taggart's Refusal to Sell Out.** matters ought to be inferred and understood by all the older men of Illinois from the illustrations of it they have seen in him during the past thirty years.

It is, however, shown more positively by an occurrence that happened in July, 1906, an account of which has not heretofore been published. At that time, long before his patents were granted, and half a year before the public announcement of his process, Dr. Taggart received a letter (which I have read) in which a perfectly responsible business man of Chicago proposed, with some of his friends, to form a corporation and take over Dr. Taggart's patents when they should be granted, with such improvement as he might make subsequently, and to pay Dr. Taggart \$100,000 cash and one-fourth of the stock. He refused the offer because he was unwilling to put it in the power of men outside the profession whom he could not control, to exploit the profession after the manner of the Vulcanite Co. At the present moment the dental profession are exploiting Dr. Taggart to such an extent that he is the only man in the profession who has not profited financially by the use of his process. It is perhaps natural that the men who are doing this should have some wholesome fear that he may retaliate if he subsequently should have the power to do so, but in view of his character and record he should not be accused of it until he begins to do it. When Dr. Taggart took his patents he was advised that he could not defend the patent on his machine without taking also a patent on the process.

What Dr. Taggart wishes to do is to sell his **Licenses Not Needed.** machines and to receive by that means his reward for what he has given to the profession. He has never asked any one for a license fee or royalties for the use of his process and his present suit is not for that purpose, but only to prevent the defendant from using his process except with his machine. Now, the purchase of the machine carries with it not as a favor or by agreement,

but by necessary legal implication, all the rights and privileges under both patents for their entire term. It has been called a mistake for Dr. Taggart to make the price of his machine so high. That may or may not be true as relates to his business interests. As it relates to the profession; if there is any man who thinks he would be casting inlays except for Dr. Taggart, let him speak up and tell us from what other source he feels sure that he would have derived the practice, and if there is any man who thinks it will not be worth \$110 to him and his patients to cast inlays, crowns and bridges during the next fifteen or sixteen years let him speak out. He would probably be laughed out of court, or, if not, perhaps those who think it is worth more would take up a collection to supply the deficiency.

There appears to be a general demand on the part of the profession that Dr. Taggart withdraw his suit and rely upon the generosity of the profession to compensate him for his sacrifices and expenses in giving the casting process to them.

**Dr. Taggart's Suit.** If during the eight months from the time his machines were ready and before the bringing of his suit there had been any adequate disposition to do justice to Dr. Taggart, leaving out generosity, no suit would have been brought. If a man owed you a debt which he acknowledged, but refused or neglected to pay, and you brought suit believing you could collect it, would you withdraw the suit and trust his generosity to pay the debt afterward? That appears to be exactly what the profession is asking of Dr. Taggart. The present attitude of the profession puts Dr. Taggart "between the devil and the deep sea." If he loses his suit to maintain his patents, they propose (judging by the experience of what the profession has done in this case and in other cases in the past) to make him a martyr financially, and if he wins his suit they intend to make him a martyr professionally for holding a process patent. The solution of this situation is simple and the moves for it are due from the members of the profession individually.

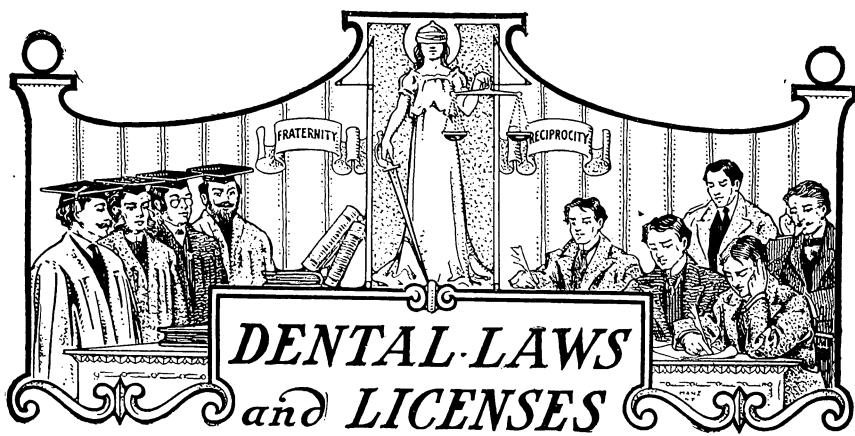
If we do not like the process patent let us sustain the patent on the machine by buying it so largely that the process patent can be left in disuse. It is a maxim of law which applies as properly before the bar of professional judgment and opinion as before a United States Court, that "He who comes into court asking for justice must himself do justice," in other words, "he must come with clean hands." How can the members of the profession come before the bar of professional judgment asking Dr. Taggart to relinquish his legal rights and depend solely on the generosity of his profession while denying him the justice they all admit to be due him? or how can any man plead for the maintenance of ethical standards unless he deals uprightly himself? The adopted



code does not include all of ethics; it was not thought necessary to say, "Thou shalt not refuse to pay just debts." It has been suggested and some men have seemed inclined to promise that if Dr. Taggart will withdraw his suit the profession will rally generously to his support. Possibly this is true, but, in view of their not having done so before he was forced to commence a suit to establish his rights, there seems reasonable doubt that they would do so now. However, should there be shown on the part of the dental profession an honest effort, even at this late date, to treat the matter fairly and deal justly, knowing Dr. Taggart as I do, I believe he would gladly meet the profession if necessary even more than half way in an honest effort to remove all difficulties between him and the profession, or that part of the profession which seems to think Dr. Taggart is wrong in the position he has taken. The remark has been made to me, "We do not like the idea of being forced to buy Dr. Taggart's machine." It is a common sentiment among honest men that they do not like to be forced to pay their debts; they, therefore, pay them voluntarily. We owe Dr. Taggart a great sentimental debt, which is to be paid in gratitude, affection, honors and fame, but we owe him just as truly a debt in money for money value received, and if we refuse or neglect to pay it we ought not to be any more surprised if we find ourselves defendants in suits at law than we would be if our butcher or grocer were to sue us for a debt we refused to pay.

EDMUND NOYES.





## A Brief Guide. State Dental Laws Condensed.

The Requirements of Dental Examiners from Applicants for a License to Practice Dentistry in the United States of America and Island Possessions.

By ALPHONSO IRWIN, D.D.S.

Secretaries of the United States Dental Examining Boards are requested to notify us of any corrections or changes in regard to dates, places of meetings and special features of examinations or any changes that may occur in their State law or the personnel of their board. It is aimed to make this publication serve as an accurate guide to dental examiners, recent graduates, colleges and the profession at large.

### Interchange of License.

District of Columbia interchanges with New Jersey.

Indiana interchanges with New Jersey, Michigan, Minnesota, Iowa.

Iowa reports interchanges with Vermont, New Jersey, District of Columbia, Indiana, Ohio, Michigan, Minnesota, Nebraska, Kansas and Oklahoma.

Michigan interchanges with New Jersey and the Canadian Northwest Territories.

New Jersey interchanges with Utah, Tennessee, Indiana, Michigan, Vermont, District of Columbia.

Oklahoma reports interchange with Arkansas.

Tennessee interchanges with New Jersey.

Utah interchanges with New Jersey.

Vermont interchanges with New Jersey.



## ITEMS OF INTEREST

**Query.** The question is sometimes asked by a graduate from a "recognized" college: "Where can I practice dentistry without having to undergo an examination before a Board of Dental Examiners?"

The answer is: Alaska, Alberta, British North Borneo, China, Germany, India, Kansas, Liberia, Mexico, Morocco, New Brunswick, Nova Scotia, Palestine, Persia, Prince Edward Island, Siam, Straits Settlements, Syria, Turkey.

**Alabama.** The Board of Dental Examiners for the State of Alabama meet in Birmingham, Ala., in May. In addition to the regular written examination the following will be required:

Each applicant must fill at least two teeth having approximal cavities, one with gold, the other with alloys; this work is to be done under the immediate supervision of the board, the latter to pass upon the selection of suitable cavities. The board will endeavor to furnish patients, but failing to do so, applicants for license must find or bring their own patients, also instruments and material. Each applicant must take an impression of the mouth, make a plaster cast of the same, and cut from the cast the six anterior teeth and make a bridge with porcelain facings. The cast may be made and the facings fitted before the examination, but the backings must be put on and the facings arranged, also invested and soldered, under the supervision of the board, hard solder being required.

Board of Dental Examiners: Dr. I. A. Hall, Birmingham, Ala., practical prosthetic dentistry, metallurgy; Dr. P. R. Tunstall, Mobile, Ala., chemistry and *materia medica*; R. B. Chapman, Troy, Ala., anatomy; T. P. Whitby, secretary, Selma, Ala., practical operative, unwritten operative; W. E. Proctor, Sheffield, Ala., dental pathology and histology.

**Arizona.** Board of Dental Examiners: Dr. Wm. P. Sims, president, Bisbee, Ariz.; Dr. J. Harvey Blain, secretary and treasurer, Prescott, Ariz.; Dr. W. A. Baker, Tucson, Ariz.; Wm. G. Loppentheim, Tucson, Ariz.; Dr. John A. Lentz, Phoenix, Ariz. They examine in the following subjects: Anatomy, physiology, chemistry, *materia medica*, therapeutics, metallurgy, histology, pathology, operative and mechanical dentistry, oral surgery. They also require demonstrations of applicant's skill in operative and mechanical dentistry. Examinations are held at Phoenix in April and November each year; fee \$25. No interchange of licenses.

**Arkansas.** Examination with or without diploma; applicants must attain an average of 75 per cent. to pass. Examination fee, \$5. No special examination granted to practitioners already in practice; no temporary licenses.

Oklahoma reports interchange with Arkansas, but the secretary of Arkansas reports no interchange as yet. Examination, Little Rock, Ark., November. Board: President, C. Richardson, Fayetteville; secretary, A. T. McMillan, Little Rock; C. C. Sims, Dordenelle; E. L. Watson, Camden; C. G. Farrow, Little Rock.

Little Rock, Ark.

DR. A. T. McMILLAN, Secretary.

**California.**

Examination required with or without diploma. Examination fee, \$25. No special examination granted to practitioners already in practice. No interchange of license with any State. Examination at San Francisco. Board of Dental Examiners of the State of California: President A. B. Mayhew, Sacramento; C. A. Herrick, secretary, 910 Hayes Street, San Francisco; J. L. Pease, treasurer, Oakland; F. G. Baird, San Francisco; G. M. Crow, Los Angeles; J. W. Neblett, Riverside; H. H. Harbison, San Diego.

**Colorado.**

The State Board meetings are held the first Tuesday in June and December. Examinations are held upon all subjects taught in any reputable dental college. All applicants must present a diploma from some reputable dental college. No interchange of license with any State, but in the case of *all* applicants an examination in full, both theoretical and practical, is required. For further information apply to Howard T. Chinn, secretary, Denver, Colo.

Dental Examiners: F. H. Sutherland, president, 207 Symes Building, Denver, examines in oral surgery and anesthesia; Howard T. Chinn, secretary, 307 Mack Building, Denver, operative dentistry and pathology; Mallony Catlett, treasurer, 526 Empire Building, Denver, examines in histology, bacteriology, *materia medica*; Clarkson W. Guyer, 301 Jackson Building, Denver, examines in chemistry, prosthetic dentistry; Theodore Ashley, Canon City, examines in anatomy and physiology.

**Connecticut.**

Applicant for license must have diploma, or five years' instruction from a licensed dentist, or three years' practice as a legally qualified dentist. Examination fee, \$25. Examinations are held in June and November. A special clause permits reciprocal interchange of licenses in accordance with the Asheville resolution, but as yet the board has not granted it, it being left to the discretion of the commission. Term of office changed to five years. Hereafter one to be appointed each year for that term. Recorder, Gilbert M. Griswold, Hartford, Conn.

State of Connecticut Dental Commissioners: President, Howard G. Provost, Winstead, term expires July 1, 1910, examines in chemistry, metallurgy and oral surgery; recorder, Gilbert M. Griswold, Hartford, term expires July 1, 1911, examines in dental and oral pathology, therapeutics and *materia medica*; Frederick W. Brown, New Haven, term expires July 1, 1912, examines in anatomy, physiology and histology; D. Everett Taylor, Willimantic, term expires July 14, 1909, examines in prosthetic dentistry, crown and bridge work and anesthesia; Albert W. Crosby, New London, term expires July 1, 1913, examines in operative dentistry, orthodontia, oral hygiene and dental prophylaxis; Gilbert M. Griswold, recorder, Hartford, Conn.

**Delaware.**

Requirements: A written notice of desire to take the examination at least two weeks before the date when held accompanied by \$11 fee. The insertion of one gold filling before the examiner of practical operations. The candidate furnishing his patient, instruments and materials, except an engine, which will be supplied. The diploma of graduation from a



recognized dental college must be shown together with a late photograph of the candidate. Also an affidavit made before one of the local notaries public in the presence of a member of the board, that the candidate is the person named in the diploma. The photograph and affidavit are retained by the board. Any candidate failing to pass the board shall not be eligible for re-examination before the date of the next regular meeting, and then only on the same conditions as a new candidate, including fees.

Board of Dental Examiners: President, Dr. R. H. Jones, "The Marquette," 10th and Washington Streets, Wilmington, Del., examines upon anatomy and surgery; secretary, Dr. C. F. Jefferis, 1016 Delaware Avenue, Wilmington, Del., examines upon operative dentistry; treasurer, Dr. S. H. Johns, 9th and Van Buren Streets, Wilmington, Del., examines upon pathology and therapeutics; Dr. C. J. Kinhead, 828 Washington Street, Wilmington, Del., examines in chemistry and *materia medica*. The regular meetings are held on the first Wednesday of January, April, July and October.

Requirements: The practical examination requirements are filling a tooth with gold, and presenting a swaged case of three or more teeth (with clasps), this to be invested and soldered in presence of examiners.

The Board of Dental Examiners and the branches on which they examine are as follows: Dr. A. D. Weakly, president, 1339 K Street, N. W., bacteriology, pathology, histology; William B. Daly, 1340 North York Avenue, N. W., anatomy and *materia medica*; W. W. Evans, Bond Building, chemistry and prosthetic dentistry; Starr Parson, secretary, 1309 L Street, N. W., operative dentistry and oral surgery; Geo. E. Welch, 1344 G Street, N. W., operative dentistry and physiology.

The semi-annual examination of the Board of Dental Examiners of the District of Columbia will be held at the Georgetown University in January and July. All applications for examination must be accompanied by a fee of ten dollars (\$10) and filed with the secretary two weeks before the examination.

For further information address, Starr Parsons, M.D., D.D.S., secretary, 1309 L Street, N. W., Washington, D. C.

**Florida.** Board: President, T. J. Welch, Pensacola, examines in prosthetic dentistry and metallurgy; secretary and treasurer, W. G. Mason, Tampa, chemistry, *materia medica*, pathology, therapeutics; C. F. Kemp, Key West, physiology and bacteriology; W. P. Taylor, Jacksonville, operative dentistry, orthodontia and oral hygiene; J. E. Chace, Ocala, anatomy, histology, oral surgery.

Requirements: Practitioners who have been in ethical practice five or more years will be allowed a credit of five points for first five years, and one additional point for each additional year. No interchange of licenses. Graduates from "reputable" dental colleges examined. Fee, \$10.

A meeting of the board will be held in Ocala on June 19, 1909.

**Georgia.** Board of Examiners: President, John H. Coyle, D.D.S., Thomasville; secretary and treasurer, D. D. Atkinson, D.D.S., Brunswick; S. D. Rambo, D.D.S.,



Marietta; C. Z. McArthur, D.D.S., Fort Valley; Thomas Cole, D.D.S., Newman.

Excerpts from the Georgia Law: Applicants must present diploma from a reputable dental college, or present a license "from some other State board." Fee, \$10.

Licenses may be revoked for "cruelty," "incapacity," "unskillfulness," "gross neglect," "indecent conduct," "professional misbehavior," "unfitness," "conviction of any misdemeanor in any court in this State."

Licenses must be "registered by the clerk of the Superior Court in the county" in which the person shall practice.

Requirements: Examination in theory and practice, the latter includes the insertion of gold fillings.

Interchanges, none.

Meetings, at the close of the college term and at the annual meeting of the Georgia State Dental Society.

Examination required with or without diploma.

**Idaho.** Examination fee, \$25. No special examination granted to practitioners already in practice.

The board may exchange licenses. (See Sec 11, New Law.)

Examinations June and November.

Board of Examiners: President, Dr. Wm. Youngberg, Couer D'Alene; secretary, Dr. E. L. Burns, Boise; Dr. C. E. M. Lousc, Pocatello; Dr. J. B. Burns, Fayette; Dr. T. Boyd McBrude, Moscow.

Examination required, with or without diploma.

**Illinois.** Examination fee, \$20. License fee, \$5. No special examination required for practitioners already in practice. No interchange of license with any other State. Examinations twice each year, usually in June and November. Secretary, J. G. Reid, 67 Wabash Avenue, Chicago, Ill.

Members of the Board: C. P. Pruyn, president, Chicago; J. G. Reid, secretary, Chicago; T. W. Pritchett, White Hall, Ill.; T. A. Broadbent, Chicago; H. L. Whipple, Quincy, Ill.

Regular meetings of the board are held in the

**Indiana.** State House at Indianapolis on the second Tuesdays of June and January, continuing for as many days as necessary. Reciprocity with New Jersey, Michigan, Minnesota and Iowa. Further information may be had upon application to the secretary.

Board of Dental Examiners: M. M. Haas, president, Evansville, examines in bacteriology, oral surgery, pathology; F. R. Henshaw, secretary and treasurer, Middletown, examines in dental medicine, anesthesia, prosthetic dentistry; J. S. McCurdy, Fort Wayne, examines in chemistry, physiology, histology and porcelain; Alex. Jameson, Indianapolis, examines in operative dentistry, orthodontia, crown and bridge work; W. H. Shaffer, North Manchester.

Examination required with diploma. Examination

**Iowa.** fee, \$20. No special examination granted to practitioners already in practice. Interchange of license with Vermont, New Jersey, District of Columbia, Ohio, Indiana, Michigan, Minnesota, Nebraska, Kansas and Oklahoma. Examinations are held in Iowa City during June and December. Secretary, E. D. Brower, Le Mars, Iowa.



## ITEMS OF INTEREST

Board: President, E. H. Ball, Tama, examiner in anatomy, physiology, chemistry and metallurgy; W. H. DeFord, Des Moines, examiner in *materia medica*, therapeutics, pathology and anesthesia; G. N. Beemer, Mason City, examiner in prosthetic dentistry, oral surgery and orthodontia; F. H. Rule, Ackley, examiner in bacteriology, histology and hygiene; E. D. Brower, Le Mars, examiner in operative dentistry and jurisprudence. Practical examination held in operative and prosthetic dentistry.

**Kansas.** No special examination granted to practitioners already in practice. No interchange of license with any States.

The meeting for examination will be held in Topeka in May. Graduates of a reputable dental college are not required to take an examination.

Board of Dental Examiners: President, G. F. Ambrose, Eldorado; vice-president, O. H. Simpson, Dodge City; secretary, F. O. Hetrick, Ottawa. Fee for registering a diploma is twenty-five dollars (\$25). The same for an examination and five dollars (\$5) additional for the certificate.

F. O. HETRICK, Secretary.

Ottawa, Kan.

**Kentucky.** The Kentucky State Board of Dental Examiners will meet for the examination of applicants at Louisville on the first Tuesday in June and in December, commencing at 9 o'clock a. m. Each applicant for examination shall be required to deposit with the secretary his or her recent photograph, with the signature on the reverse side, both of which shall be certified to by the dean of his or her graduating college or other parties acceptable to the board. Applicants must be graduates of reputable dental colleges, and be examined in the following subjects: Anatomy, physiology, *materia medica*, pathology, histology, operative dentistry, oral surgery, chemistry, metallurgy, prosthetic dentistry, crown and bridge work, oral hygiene and dental prophylaxis. Every applicant shall be required to insert two gold fillings and two amalgam fillings. In prothesis take an impression bite, and articulate the teeth of an upper or lower denture; construct one bridge on a model, consisting of one shell and one Richmond crown and two porcelain faced dummies; one gold or porcelain inlay or Logan crown; all to be done before the board. A general average of 75 per cent. is required. Applicants will be graded upon a basis of 3-5 on practical work and 2-5 on theory. Applicants must come prepared with instruments, engine and material, except bellows, blowpipe, lathe, stones and polishing cones, to do the above-mentioned work. The board would advise the use of gold in the bridge work. Application for examination must be made upon blanks furnished by the board, accompanied by a fee of \$20 and the photograph, all of which must be filed with the secretary ten days before the date of examination.

Board of Dental Examiners: President, C. W. McGuair, Mumfordville, term expires 1913; Dr. J. W. Juett, Eminence, term expires 1910, examines in pathology and histology; J. Richard Wallace, secretary, Louisville, term expires 1912, examines in chemistry and metallurgy; G. W. McGuair, Mumfordville, examines in *materia medica* and operative



dentistry; Fred I. Wilder, Louisville, term expires 1909, examines in anatomy, physiology, oral hygiene and dental prophylaxis; C. R. Shacklette, Louisville, term expires 1911 examines in oral surgery, prosthetic dentistry and crown and bridge work.

**Louisiana.** Board of Dental Examiners: J. E. Woodward, D.D.S., president, 815 Hennion Building, New Orleans; R. L. Zelenka, Houma, La.; J. Sidney Couret, New Orleans; C. B. Johnston, Monroe; Geo. A. Colcomb, New Orleans; L. A. Hubert, attorney, secretary and treasurer, New Orleans.

Requirements: "All applicants must be graduates and stand examinations."

Reciprocity: "This board will interchange licenses with any board which has the same requirements of graduation and examination. Provided that such applicant shall have practiced five years in the State from which the said applicant shall come; not having failed before the Louisiana State Board of Dentistry, and declare his intention of actual residence in Louisiana, all declared under oath."

Examination: All board meetings are held at New Orleans; the first session beginning on the second day following the commencement of the New Orleans College of Dentistry; and the second session beginning on the Wednesday following the third Monday of October of each year.

L. A. HUBERT, Attorney and Secretary.

**Maine.** Board of Dental Examiners: President, Langdon S. Chilcott, D.D.S., Bangor, examines in operative dentistry and dental surgery; secretary, Dana W. Fellows, Portland, examines in anatomy, physiology, histology; Edmund C. Bryant, Pittsfield, examines in materia medica, therapeutics and bacteriology; Will S. Payson, Castine, examines in prosthetic dentistry, orthodontia metallurgy; Ernest L. Hall, Augusta, examines in chemistry, anesthetics and anesthesia.

Meetings of the Board of Dental Examiners of the State of Maine are held at Portland. Each applicant is required to bring gold foil and such instruments and appliances as he may require in operating upon the teeth. Patients may often be secured at the infirmary, but applicants should arrange to bring patients with them. Theoretic examinations will be in writing, and all answers must be written in ink. Each applicant is also requested to bring a tooth in plaster with cavity prepared, to be filled with non-cohesive gold in the presence of the examiners. The application must be filed and the fee of twenty dollars (\$20) must be paid before examination.

**Maryland.** Board of Dental Examiners: M. G. Sykes, Ellicott City, president, examines in chemistry and bacteriology; W. W. Dunbracco, Baltimore, examines in operative dentistry; P. E. Sasscer, La Plata, examines in oral surgery; F. F. Drew, Baltimore, secretary, examines in pathology, therapeutics and materia medica; F. A. Wilson, Baltimore, examines in anatomy and physiology; T. B. Moore, Rising Sun, examines in mechanical dentistry.

Two examinations are held annually, one in May and another in November. No special examination for those already in practice. The



## ITEMS OF INTEREST

rule is to examine all graduates, but in the cases of practitioners of long practice and undoubted standing the board may register without examination. No interchange of licenses with other States.

F. F. DREW, Secretary.

**Massachusetts.** Members of Massachusetts Board: Dr. John F. Dowsley, 175 Tremont Street, Boston, president; Dr. G. W. Everett Mitchell, Haverhill, Mass., secretary; Dr. Geo. A. Maxfield, Holyoke, Mass.; Dr. Thos. J. Barrett, Worcester, Mass.; Dr. Wm. W. Marvell, Fall River, Mass.

Examinations for 1909 are held in March, June, October. The dates are published in the dental journals the month preceding the examination.

All candidates examined must be of good moral character, and twenty-one years of age.

Fee, \$20, first examination; second examination no fee; third and subsequent examinations, \$5.

Temporary licenses are not granted.

No interchange of certificates with other States.

Application blanks and all information must be obtained of the secretary, Dr. G. E. Mitchell, 25 Merrimack Street, Haverhill, Mass.

**Michigan.** Examination required with diploma. Examination fee, \$20. No special examinations or temporary licenses granted. Reciprocal interchanges of licenses

with New Jersey, Iowa, Ohio, Indiana and Minnesota. Secretary, A. B. Robinson, 44 Sheldon Street, Grand Rapids.

Board: President, E. A. Honey, Kalamazoo; secretary, A. B. Robinson, Grand Rapids; G. H. Oakman, Detroit; A. L. LeGro, Detroit; A. W. Haidle, Negaunee. The appointment of a new member is pending.

**Minnesota.** Meetings: Place—All meetings for examination are held at the Dental Department of the State University in Minneapolis.

Time—Regular sessions are held on the second Tuesday after the first Monday in March and November and continue as long as necessary. A special meeting is usually held in June.

Applications: Blanks—All applications must be made on blanks furnished by the board.

Fees—A fee of ten dollars (\$10) must accompany each application and is in no case returnable.

Time—All applications must be in the hands of the secretary at least two weeks previous to the examination.

Eligibility: To take the examination it is necessary to present a diploma from a dental college in good standing or to furnish the required proofs that the applicant has been licensed and has practiced in another State for five years or more; the board being the judge of the standards of the various States having and maintaining a standard equal to Minnesota.

Examinations: Written—All applicants, except those who have been in legal practice for five years or more in another State having and maintaining a standard equal to ours, shall be given a written examination on the following subjects: (1) anatomy, (2) physiology, (3) chem-



## ITEMS OF INTEREST

istry, (4) *materia medica* and *therapeutics*, (5) *metallurgy*, (6) *pathology* and *oral surgery*, (7) *operative dentistry* and *orthodontia*, (8) *prosthetic dentistry*.

**Practical**—A practical examination is given all applicants, consisting of the preparation of a cavity and the making of a gold filling or the preparation of the root and making of a crown, or both, for a patient supplied by the board.

**Materials and Instruments**—All instruments and materials necessary to perform the required operations, except foot bellows, must be brought to the examination by the applicant. All operations and work must be performed at the place of meeting.

Temporary licenses are not allowed by law.

All communications should be addressed to the secretary.

DR. GEO. S. TODD, Secretary.

Lake City, Minn.

A diploma must be presented from a dental college in good standing or candidate must furnish the required proofs that the applicant has been licensed and has practiced in another State for five years or more, such State having and maintaining a standard equal with Minnesota, the board being the judge of the standards. Examination fee, \$10. No temporary licenses granted of any kind. Interchange licenses with Iowa, Indiana, Nebraska and Michigan as far as the theoretical examination goes. All applicants must take the practical examination. Examinations held on the second Tuesday after the first Monday in March and November. A special meeting is usually held in June. All examinations are held at Dental Department of State University in Minneapolis.

**Board of Dental Examiners**: President, F. S. James, Winona; secretary, G. S. Todd, Lake City; H. W. Berthel, St. Paul; S. H. Holden, Duluth; J. W. Penberthy, Minneapolis.

For further information apply to the secretary, G. S. Todd, Lake City, Minn.

**Mississippi.** The Board of Dental Examiners of Mississippi will meet to examine applicants at Jackson. For particulars and requirements address the secretary.

The board consists of Drs. P. H. Wright, Oxford; L. B. McLaurin, Natchez; A. B. Kelley, Yazoo City; J. H. Shumaker, Poplarville, and E. Douglas Hood, Tupelo. Dr. A. B. Kelley, of Yazoo City, president, and Dr. E. Douglas Hood, of Tupelo, secretary.

Excerpts from the Dental Law of Mississippi: "Sect. 1527. Every person who desires to practice dentistry must obtain a license to do so, as hereinafter provided."

"Sect. 1532. The Board of Dental Examiners shall meet at the capital of the State on the third Tuesday of May in each year for the purpose of examining applicants for a license to practice dentistry; and to continue in session until all applicants for license have been examined and their examination has been approved or disapproved. All examinations, except as to character, shall be upon written questions on the following subjects: Operative dentistry, prosthetic dentistry, oral surgery, physiology, metallurgy, anesthetics, orthodontia; and in chemistry anatomy, *materia medica*, pathology, *therapeutics*, histology and bacteriology as



they pertain to dentistry; together with a practical examination in operative and mechanical dentistry, three members of the board constituting a quorum for business."

Fee, \$10. Licenses are granted to "existing practitioners."

"Temporary licenses are granted."

The meeting of the State Board of Dental Examiners for the State of Missouri is in Jefferson

City, Mo., in May. Applicants should come with all instruments and material to do operative work. A diploma from a reputable dental college, or a certificate of registration from another State is essential to examinations. The fee is ten dollars.

Board of Dental Examiners: H. B. Purl, president, Kirksville; T. E. Turner, vice-president, St. Louis; S. C. A. Rubey, secretary, Clinton; R. D. McIntosh, Joplin; C. B. Coleman, Poplar Bluff; W. E. Owen, general attorney, Clinton; Guy A. Thompson, St. Louis; A. N. Adams, Kansas City.

**Montana.** Annual meeting second Monday in July, 1909, continuing three days. Examination in all cases.

Fee, \$25. No interchange of license as yet.

President, Dr. C. H. Head; vice-president, Dr. G. W. Pelzer; secretary, Dr. D. J. Wait; treasurer, Dr. G. A. Chevigny; legal adviser, Dr. W. A. Tudor.

Helena, Mont.

DR. D. J. WAIT, Secretary.

Subjects: Oral surgery and histology, dental pathology and dental medicine, anatomy, physiology, chemistry and metallurgy, operative and mechanical dentistry.

License must be registered with the county clerk within sixty days. Fee, \$25.

The following clause is quoted from the Montana law because it is an excellent provision and should be incorporated in every State law (A. Irwin):

"Every registered dentist shall in each and every year pay to the Board of Dental Examiners a fee of one dollar as his annual dues, each payment to be made on the first day of May of each year."

In case of default the certificate may be revoked.

**Nevada.** State Board of Dental Examiners: Drs. W. H. Cavell, president, Carson City, examines in anatomy,

physiology, metallurgy, histology; W. W. Goode, secretary and treasurer, Carson City, examines in chemistry, pathology, materia medica, oral surgery; C. A. Coffin, Reno, examines in operative dentistry, prosthetic dentistry, hygiene, dental jurisprudence; Elton N. W. Davis, Tonopah; Helen M. Rulison, Reno.

Carson City, Nev.

DR. W. W. GOODE, Secretary.

Examination required with or without diploma.

**New Hampshire.** Examination fee, \$10. No special examination.

Examination held in Manchester, N. H., in June and December of each year. No interchange of licenses with any State.

Manchester, N. H.

A. J. SAWYER, Secretary.



Board of Registration in Dentistry: President, G. A. Bowers, D.D.S., Nashua, N. H., examines in anatomy, physiology and oral surgery; secretary, A. J. Sawyer, D.D.S., Manchester, N. H., examines in operative dentistry, histology, pathology and therapeutics; H. R. Beale, D.D.S., Kane, N. H., examines in prosthetic dentistry, chemistry and *materia medica*.

**New Jersey.** Applicant must be a graduate of a reputable dental college. Examination fee, \$25. Reciprocal interchange of license with Utah, Tennessee, Indiana, Michigan, Vermont and District of Columbia. Practical and theoretical examination conducted in the Assembly Chamber, Trenton, N. J. Examinations are held the first Monday after the 4th of July, and the first Monday in December each year. Professional attainments, preliminary qualifications and photograph must accompany application to secretary, Dr. Chas. A. Meeker, 29 Fulton Street, Newark, N. J.

Examiners: President, B. F. Luckey; secretary-treasurer, Chas. A. Meeker; Wm. E. Truex, Alphonso Irwin, H. S. Sutphen.

Requirements of Application: 1. All persons desiring to commence the practice of dentistry in New Jersey must apply to this board for a license so to do.

2. Applicants for examination shall present to the secretary of this board at least two weeks before the commencement of the examination, at which he or she is to be examined, a written application on a form provided by said board, together with a certified check or money order for twenty-five dollars (\$25), the regular examination fee.

3. Evidence that applicant is twenty-one years of age.

4. Certificates of moral character from two dentists in good standing, one of whom must be a resident of New Jersey.

Preliminary Educational Requirements: Candidates for examination to secure license to practice dentistry in New Jersey must present certificates showing that they have fully completed a three years' course of study in an accredited high school, or hold other certificates or diplomas, which shall be regarded as the equivalent thereof. A 48-count, New York Board of Regents' certificate will be accepted.

Professional Education: Applicants not possessing any preliminary credentials will be required to go before the Superintendent of Public Instruction, State House, Trenton, N. J., and take an examination covered by a third grade county teachers' certificate, which comprises the following subjects: Orthography, reading, elementary composition, United States history, civics and temperance physiology, penmanship, arithmetic, English grammar and geography.

Examination: Theoretical—All examinations shall be written in the English language, and shall be on the following subjects:

(Sec. 1.) Anatomy, physiology and histology.

(Sec. 2.) *Materia medica*, therapeutics, anesthetics and pathology.

(Sec. 3.) Theoretical operative dentistry, practical operative dentistry and oral surgery.

(Sec. 4.) Theoretical prosthetic dentistry, practical prosthetic dentistry and metallurgy.



(Sec. 5.) Orthodontia, crown and bridge work and chemistry.

Practical Operative Dentistry: Each candidate must bring his patients, also all instruments.

A chair and engine will be provided.

The cavity must be reasonably difficult.

Cavities for gold must be approximal.

Candidate may use any style of gold excepting crystal, sponge or mat gold.

One gold and one amalgam filling will be required.

Practical Prosthetic Dentistry: The applicant must present a full upper set, invested and ready for soldering. This must consist of a gold or silver plate, with soldered band over a set of single gum teeth, ground and backed, band and backing of the same material as plate. The plate must be struck from dies made from an impression of a mouth, and the articulating model, with the plate, when soldered, must be submitted for inspection. *The plate must be removed from the investment by the applicant before the examiner.*

The candidate must bring solder, blowpipe and rubber tubing at least six feet long for connection with gas outlet. The plate must be properly invested and ready for heating, with a sufficient quantity of solder and flux ready for use.

*No excuse will be accepted for failure to comply with these instructions.*

An affidavit will be required stating that the work, preparatory to soldering, from the taking of the impression to the final investment, was done by the applicant without assistance from anyone. When examination is completed satisfactorily the plate will be returned to candidate. The board will not be responsible after thirty days for its return.

First.—The theoretical examinations will commence promptly at 9 a. m. on the days designated, and continue until applicants have been examined. Notice will be sent each candidate when he will be required to solder his plate, and also when to bring patient for operating.

Second.—Each candidate will receive a card, with his examination number. By this number shall the candidate be known throughout the examination.

Third.—Applicants shall affix to their examination papers their number only, and, on the completion of each paper, shall present the card to the examiner in charge of that section for his signature; at the completion of the examination the candidate shall sign the card under the number with full name and address and return to the secretary.

Fourth.—Questions must be answered in routine, and papers handed in to the examiner of the section at the end of each session. All unanswered questions will be marked against the applicant.

Fifth.—Any candidate withdrawing from the sight of the examiner without permission shall forfeit his examination on that section.

Sixth.—Practical prosthetic, practical operative work in the State House at Trenton, N. J. Theoretical examination, Trenton, N. J.

Seventh.—All theoretical examinations shall be in writing. Candidates must come provided with fountain or stylographic pens.

Eighth.—Help of every kind must be removed from the reach and



sight of the candidate. Any candidate detected in any attempt to give or obtain aid, in copying the questions, or in using any other unfair means, shall be instantly dismissed from the room, and his papers for the entire work shall be canceled.

Candidates are required to take entire examination, or no credit will be given, as no partial examination will be accepted.

All papers and signed cards must be turned in to the secretary by 5.30 p. m. on the last day of the examination.

All communications should be addressed to the secretary, Chas. A. Meeker, 29 Fulton Street, Newark, N. J.

**Requirements:** Rule 1.—All persons desiring  
**New Mexico.** to commence the practice of dentistry in the Territory of New Mexico must apply to the Territorial

Board of Dental Examiners for examination, and must present at the time of examination his or her diploma from a reputable dental college, and on satisfactory examination will be granted a license.

Rule 2.—Applicants are requested to present to the secretary of the board at least five days before the date set for the examination a written application on a form furnished by the board, and said application must be accompanied with the fee of \$25.

Rule 3.—The examination shall consist of the following branches written in the English language: Operative dentistry, prosthesis, chemistry, anatomy, physiology, pathology, metallurgy, materia medica, anesthetics, orthodontia, histology, hygiene and oral surgery.

Rule 4.—Examination on theory and practice shall be of equal value.

Rule 5.—Practical operations shall consist of cases selected by the board patient and instruments to be furnished by applicant.

Rule 6.—Applicant must bring instruments and material to do all practical operations at the chair, also plaster models and bite for a full denture, and carry case to the point of flasking.

Rule 7.—All written examinations shall be on paper furnished by the board; no other paper will be allowed in the room; when papers are turned in questions must accompany answers, otherwise papers will not be accepted.

Rule 8.—After two-thirds of the applicants have finished a subject others will be given thirty minutes to finish, at which time they must turn in their papers.

Rule 9.—No license will be issued to applicants whose average is below 75 per cent.

Rule 10.—Write answers in order of questions; don't give information that is not asked for.

*No temporary certificates issued.*

The next examination will be held at Albuquerque, June, 1909.

Communication with this board must be accompanied by stamps if an answer is expected.

**New York.** Diploma from a registered school is necessary for admission to the dental licensing examination.

Applicants who have had six years' practice in dentistry may, on unanimous recommendation of the board, receive a license to practice in this State, provided they meet the necessary professional



and preliminary requirements. Fee, \$25. Chief, Chas. F. Wheelock, Examination Division, New York State Education Department, Albany, N. Y.

Board of Dental Examiners: President, Alex. M. Holmes, Morrisville, N. Y.; anatomy, secretary, H. J. Burkhardt, Batavia, N. Y.; physiology and hygiene, A. M. Wright, M.D.S., 4 St. Paul Place, Troy, N. Y.; chemistry and metallurgy, A. R. Cooke, D.D.S., 815 University Block, Syracuse, N. Y.; oral surgery and pathology, Wm. C. Deane, D.D.S., 616 Madison Avenue, New York City; prosthetic dentistry, Oscar J. Gross, D.D.S., 4 South Church Street Schenectady, N. Y.; therapeutics and materia medica, Fayette C. Walker, M.D.S., 309 State Street, Brooklyn, N. Y.; histology, W. A. White, Phelps, N. Y.

**Requirements:** Examination with or without **North Carolina.** diploma. Examination fee, \$10. No special examination granted to practitioners already in practice. Secretary, R. H. Jones, Winston-Salem, N. C.

Board of Dental Examiners: Dr. V. E. Turner, president, examines in histology and oral surgery; Dr. F. R. Harris, examines in pathology and therapeutics; Dr. E. J. Tucker, examines in prosthetic dentistry and metallurgy; Dr. J. N. Johnson, examines in anatomy and physiology; Dr. J. H. Wheeler, examines in operative dentistry; Dr. R. H. Jones, secretary, examines in chemistry and materia medica.

**Examination required with or without diploma.**  
**North Dakota.** Examination fee, \$10; additional fee for license, \$5. No special examination granted to practitioners already in practice. No interchange of license with any States. Examination second Tuesday in July. Secretary, H. L. Starling, Fargo.

Board of Dental Examiners: President, G. T. McDonald, Jamestown; vice-president, W. J. Brownlee, Devil's Lake; secretary, H. L. Starling, Fargo; C. F. Sweet, Minot.

**Ohio.** All applicants for license must pass the examinations prescribed by law. Only graduates of reputable dental colleges are eligible to appear for examination. The board may excuse from the written examination an applicant who has been in legal and reputable practice in another State, territory or district for at least five consecutive years next prior to filing his application and who holds a license from a similar dental board thereof, provided the laws of such State, territory or district accord equal rights to a dentist of Ohio holding a license from the State Dental Board. All applicants are required to take the clinical examination. Examinations are held in Columbus during the months of June and October. Examination fee, \$25. Applications should be filed with the secretary ten days prior to date of examination. Secretary, F. R. Chapman, 305 Schultz Building, Columbus, Ohio.

State Dental Board: President, F. H. Lyder, 80 South Main Street, Akron, examines in materia medica, therapeutics and orthodontia; secretary, F. R. Chapman, examines in pathology, histology and bacteriology; treasurer, L. L. Yonker, Bowling Green, examines in chemistry, metallurgy and prosthetics; H. C. Brown, Columbus, examines in opera-



tive dentistry, oral surgery and oral hygiene; W. D. Tremper, Portsmouth, examines in anatomy, physiology and anesthetics.

Examination required with or without diploma.

**Oklahoma.** Examination fee, \$25. No special examination granted to practitioners already in practice. Reciprocal interchange with Iowa. Examinations usually held in May and November of each year in Oklahoma City.

Board of Dental Examiners: President, W. W. Bryan, Claremore; secretary, I. C. Hixon, Guthrie; treasurer, F. G. Seids, Perry; M. W. Murray, Poteau; A. E. Bonnell, Muskegee.

Guthrie, Okla.

DR. I. C. HIXON, Secretary.

All applicants must be examined. Candidates must have good moral character, diploma from reputable dental college, pay a fee of \$10, file application thirty days in advance and pass a written examination. The meetings of the board are held semi-annually in June (at Portland) and November.

Board of Dental Examiners and the branches on which they examine: President, E. A. Vaughn, Pendleton, Ore., anatomy and physiology; Dr. Mark Hater, Dallas, Ore., operative and prosthetic dentistry; Dr. J. M. Yates, Portland, Ore., dental anatomy and pathology; Dr. A. S. Essen, The Dalles, Ore., materia medica and therapeutics; H. H. Olinger, secretary, Salem, Ore., chemistry and metallurgy.

Examination required in all cases. Diplomas

**Pennsylvania.** required from all applicants except those coming under ten-years clause of new dental law. Special examinations given those entitled to license under provisions of new law. Examination fee in all cases, \$25. Examinations in June and December. Simultaneously in Philadelphia and Pittsburgh.

Secretary of Dental Council, Hon. Nathan C. Schaeffer, superintendent of Public Instruction, Harrisburg, Pa.

Board of Dental Examiners: President, H. B. McFadden, Philadelphia; secretary and treasurer, W. D. DeLong, Reading; Howard E. Roberts, Philadelphia; C. B. Pratt, Pittsburgh; H. W. Arthur, Pittsburgh; H. C. Register, Philadelphia.

Reading, Pa.

DR. W. D. DELONG, Secretary.

Board of Registration in Dentistry: Forest C.

**Rhode Island.** Eddy, 221 Butler Exchange, Providence, R. I., operative dentistry, bacteriology; Charles, 24 High Street, Pawtucket, R. I., physiology, pathology; Albert L. Midgley, 312 Butler Exchange, Providence, R. I., anatomy, histology, surgery, orthodontia; James F. Gilbert, Woonsocket, R. I., prosthetic dentistry, metallurgy, crown and bridge work; Harry L. Grant, materia medica and therapeutics, chemistry, anesthesia.

All applicants examined. Examination fee, \$20. No special examination granted to practitioners already in practice. Secretary, Harry L. Grant, 1025 Banigan Building, Providence, R. I.

"As the membership of our board changes every year we examine in different subjects. Next year (1909) it may be entirely different."

HARRY L. GRANT, Secretary.



## ITEMS OF INTEREST

**South Carolina.** Examinations are theoretical and practical on regular college branches. Applicants must furnish instruments and material for any demonstrations called for by the board. Applicants must exhibit diploma of a reputable dental college before being registered for examination. Must present a four or six-tooth bridge invested ready for soldering in presence of board.

Board of Dental Examiners and the branches on which they examine: President, G. F. S. Wright, Georgetown, chemistry, physiology, pathology; secretary, Brooks Rutledge, Florence, S. C., operative dentistry, orthodontia, crown and bridge work, anatomy; Dr. W. J. Ray, Aiken, S. C., mechanical dentistry, oral surgery, anesthesia; Dr. E. C. Jones, Newberry, S. C., materia medica, bacteriology, therapeutics, metallurgy.

**South Dakota.** Board of Dental Examiners and the subjects on which they examine: President F. N. Palmer, Madison, examines in materia medica, prosthetic dentistry and orthodontia; Dr. G. W. Collins, secretary, examines in operative dentistry and anesthesia; F. E. McCartney, Mitchell, examines in oral surgery and physiology; F. E. Field, Sioux Falls, examines in anatomy, chemistry and metallurgy; C. W. Stutenroth, Watertown, examines in histology, pathology and bacteriology.

**Texas.** State Board of Dental Examiners: Dr. H. W. Lubben, Galveston, president; Dr. Sam G. Duff, Greenville, vice-president; Dr. Bush Jones, Dallas, secretary; Dr. J. H. Grant, Palestine; Dr. J. M. Murphy, Temple; Dr. C. M. McCauley, Merkel.

Examinations are held in Houston, Texas. Applications accompanied by fee of \$25 should be in the hands of the secretary prior to examination.

Diplomas are not registered, examination required of all. Examination fee, \$25. No special examination to practitioners already in practice. No interchange of license with other States. Temporary license granted upon a written examination before one member of the board good until the following meeting. Application ten days before examination should be made to Secretary Bush Jones, Dallas, Texas.

**Tennessee.** All applicants must possess diploma and pass an examination, both theoretical and practical. Examination fee, \$10. No special examination to practitioners already in practice. Reciprocal interchange of license with New Jersey, in accordance with the provision of the Asheville resolution. Secretary-treasurer, F. A. Shotwell, Rogersville, Tenn.

Board of Dental Examiners: President, N. H. P. Jones, Nashville; secretary, F. A. Shotwell, Rogersville; J. M. Glenn, Jackson; John R. Beach, Clarksville; Southall Deckson, Boliver; B. D. Branson, Knoxville. Applicants must apply to the secretary and treasurer at least ten days in advance of examination. Examination is in Nashville, Tenn., May 18-21, 1909.

**Utah.** Examination required with or without diploma. Examination fee, \$25. No special examinations granted to practitioners already in practice. Re-



## ITEMS OF INTEREST

ciprocal interchange of license with New Jersey in accordance with the provisions of the Asheville resolution. Examinations usually in April and October. Secretary, A. C. Wherry, Salt Lake City, Utah.

Board of Dental examiners and the branches in which they examine: S. H. Clawson, president, Salt Lake City, surgical and mechanical dentistry; W. G. Dalrymple, vice-president, Ogden, Utah, materia medica and chemistry; A. C. Wherry, secretary and treasurer, Salt Lake City, operative dentistry and metallurgy; E. A. Tripp, Atlas Building, Salt Lake City, pathology, histology and bacteriology; H. W. Davis, Templeton Building, Salt Lake City, anatomy and physiology.

**Vermont.** Examination required in all cases. Examination fee, \$25. No special examination for practitioners already in practice.

Board is empowered to make interchange of license in accordance with the Asheville resolution. Interchange with New Jersey. Secretary, G. F. Cheney, St. Johnsbury, Vt.

Board of Examiners: President, M. L. Cleaves, Montpelier; secretary and treasurer, J. H. Jackson, Burlington; G. F. Cheney, St. Johnsbury; L. E. Mellen, Middleburg; E. O. Blanchard, Randolph.

Examinations required with or without diploma.

**Virginia.** Examination fee, \$10. No special examination granted to practitioners already in practice. No interchange of license with any State. Examinations in Richmond, Va., the second Tuesday in June of each year. Secretary, R. H. Walker, Norfolk, Va.

Board of Dental Examiners: President, H. W. Campbell, Suffolk, examines in pathology and therapeutics; secretary, R. H. Walker, Norfolk, examines in operative dentistry; B. Bridgeforth, Richmond, examines in oral surgery and chemistry; R. C. Lewis, Culpepper, examines in histology and anatomy; J. A. Colvin, Charlottesville; J. B. Stiff, Fredericksburg, examines in metallurgy and prosthetic dentistry.

**Washington.** Requirements: Examination required with diploma. Examination fee, \$25. No special examinations granted to practitioners already in practice. No interchange of license with any State. Examinations in Tacoma during May and November.

Board of Examiners: President, E. B. Edgars; secretary, H. D. Brand, Tacoma; C. S. Irwin, Vancouver; W. A. Fishburn, Ellensburg; F. B. Fisk, Spokane.

**West Virginia.** Board of Dental Examiners: President, C. H. Bartlett, Parkersburg; secretary, J. Fleetwood Butts, Charleston; attorney, Mason B. Ambler, Parkersburg; W. A. Williams, Huntington; Fred R. Stathers, Clarksburg; John W. Storer, Wheeling.

They examine in the following branches: Anatomy, histology, physiology, materia medica, metallurgy, bacteriology, chemistry prosthetic dentistry operative dentistry, oral surgery.

**Wisconsin.** Examination required with diploma. Examination fee, \$10. Dentists who have practiced for four years or have been apprenticed to a reputable dentist



for five years are entitled to examinations. No special examination granted to practitioners already in practice. No interchange of license with any State. Examinations at Milwaukee.

Board of Dental Examiners: President, J. J. Wright, Milwaukee; secretary, F. A. Tate, Rice Lake; C. S. McIndoe, Rhinelander; Chas. H. Seegar, Manitowoc; C. C. Marlowe, Lancaster.

An examination is required of all applicants and **Wyoming.** only holders of diplomas from reputable dental colleges are eligible to such examination. No dentist can begin the practice of his profession in this State without first making application for an examination to the secretary of the board, and at the same time paying the examination fee of twenty-five dollars and submitting his diploma for inspection. The applicant will then be examined at the next meeting of the board, and if he passes a satisfactory examination a license will be issued to him. Until he receives this license he is not authorized to begin practice, and no license can be granted under the law except at a regular meeting of the board. The possession of a diploma in itself gives no right to practice in this State. One examination is held annually the first week in July each year. The time, date and place are set by the board. All applications must be completed and in the hands of the secretary thirty days prior to the time set by the board for examinations to begin. Besides the written examinations each applicant must come prepared to do any practical work which may be required. For further information and application blanks, address Peter Appel, Jr., secretary, P. O. Box 643, Cheyenne, Wyoming.

The board will meet to hold examinations July 5, 6, 7, 1909, at the State Capitol Building, Cheyenne, Wyo. The passing grade in operative and prosthetic dentistry must be 85 per cent., and in all the other branches 75 per cent.

Board of Dental Examiners: Drs. Wm. Frackleton, Sheridan, president, examines in physiology, operative dentistry, pathology and oral surgery; W. C. Cunningham, Evanston, treasurer, examines in chemistry and metallurgy, prosthetic dentistry; Peter Appel, Cheyenne, secretary, examines in anatomy, histology, bacteriology, anesthesia, therapeutics and materia medica.

**Alaska.** Alaska has no dental examining board and but thirty-three dentists are reported according to the latest information obtainable. Repeated efforts to secure information from official sources having met without reply, individual dentists in Alaska were interrogated with this result:

"FAIRBANKS, ALASKA, December 9, 1908.

Dear Doctor:

The field is open in Alaska. No credentials of any kind are necessary. Don't know what town to recommend. This place and the surrounding country is pretty well represented in all the professions and especially dentistry. I don't think any one coming here to practice dentistry would make any money. It costs \$150 to \$160 to come here from Seattle.

Yours truly,

DR. N. W. TRABUE."

"Alaska has never had a valid medical law until last year. When a medical law was passed requiring a five-year residence in Alaska, or in lieu of that a diploma from a recognized college, or a satisfactory examination before a Board of Examiners.

"Our delegates in Congress will have a similar dental law introduced at this session which will no doubt pass (as it has the endorsement of the medical profession, without opposition).

"The people are now demanding stringent medical and dental laws on account of the injury done them by incompetents and quacks who have come to Alaska because they could go no where else.

"Nome, Alaska, January 4, 1909.

"A. D. ANDREWS."

**Hawaii.** Examination required with diploma. Examination fee, twenty dollars (\$20). No special examinations granted practitioners already in practice. No interchange of license with any State. Examinations occur annually, in July, in Honolulu

Board of Examiners: President, Geo. H. Huddy, D.D.S., Lihue; secretary and treasurer, C. B. High, D.D.S., Young Building, Honolulu.

Members of Board: Geo. H. Huddy, C. B. High and A. J. Derby.

For further information, blanks, etc., address Secretary C. B. High, Young Building, Honolulu, Hawaii.

Sect. 5. Dental Laws of Hawaii: "Any one twenty-one years of age and of good moral character, who has graduated at and holds a diploma from a reputable dental college, and who desires to practice dentistry in this territory, shall file his application with and pay to the secretary of the board a fee of \$20, which in no case shall be refunded, and shall present himself or herself for examination at the first meeting of the board after such application, and upon passing an examination satisfactory to the board his or her name, age, nationality, location and number of years of practice shall be entered in a book kept for that purpose and a certificate of a license to practice shall be issued to such person."

**Philippine Islands.** An Act Regulating the Practice of Dentistry in the Philippine Islands: By authority of the United States, be it enacted by the Philippine Commission, that:

Section 1. The Commissioner of Public Health for the Philippine Islands shall appoint a Board of Dental Examiners for the Philippine Islands, with the advice and consent of the Board of Health for the Philippine Islands, consisting of three reputable practitioners of dental surgery, who shall be graduates in good standing of legally incorporated dental educational institutions recognized by the National Association of Dental Faculties and the National Association of Dental Examiners of the United States of America. They shall hold office for three years after their appointment, and until their successors are appointed and qualified:

Provided, that the first appointees shall be appointed for a period of one, two and three years, respectively, as specified in their certificates of appointment from the Commissioner of Public Health; and provided



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further, that no member of the faculty of any school, college or university in which dentistry is taught shall be eligible for appointment on said board.

### Sec. 3. Dental Laws of Philippine Islands:

"The Board of Dental Examiners shall meet in the city of Manila for the purpose of examining candidates desiring to practice dentistry in the Philippine Islands on the first Tuesday of January and July of each year, after giving thirty days' written or printed notice of such meeting to each candidate who has filed his name and address with the secretary and treasurer of the board, and after publishing such notice in one newspaper published in the English language and one newspaper published in the Spanish language at Manila at least once per week for a like period. The Board of Dental Examiners shall issue a dental surgeons certificate to each candidate who furnishes satisfactory proof of having received a diploma as either Doctor of Dental Medicine or Doctor of Dental Surgery from a legally incorporated dental educational institution, and who in addition passes a satisfactory examination before the board in the following subjects: Anatomy, physiology, histology, physics, chemistry, metallurgy, dental anatomy and orthodontia, oral surgery, operative dentistry and prosthetic dentistry. From each candidate the secretary and treasurer shall collect a fee of \$10."

Board of Examiners: President, H. C. Strong, Manila; secretary and treasurer, A. P. Preston, Manila; Antonio Vergel de Dros, Manila.

**Porto Rico.** The holding of a diploma of a reputable American dental college does not exempt the applicant from an examination before the Dental Board of Examiners of Porto Rico. However, if the applicant possesses a license from a State where the requirements are equal to those of Porto Rico, it is discretionary with the board to grant a license without an examination.

The dental law in force on the Island will probably be modified during the coming session of the Legislative Assembly of Porto Rico. Such modifications as contemplated will not affect the law in its general sense, but will refer only to details which at present are not wholly intelligible.

Board of Dental Examiners: Dr. Manuel V. del Valle, president, 52 Allen Street, San Juan, P. R.; Dr. L. Emilio Chevremont, secretary, 91 San Francisco Street, San Juan, P. R.; Dr. J. Modesto Bird, Fajardo, P. R.

Dental law of Porto Rico permits applicants to obtain a license who possess a diploma from a college "possessing a sufficiently high grade of standard dental education." (See Sect. 5, Dental Law of Porto Rico.)

# IN MEMORIAM

## Henry Lauriston Upham

Henry Lauriston Upham was born in Phillipston, Mass., February 25, 1848, and died in Boston, Mass., February 26, 1909.

He was the son of Joseph E. and Susan P. (Newton) Upham.

His early education was obtained in his native town, graduating from the Templeton (Mass.) High School later, after which, for a short period, he attended the New Ipswich Academy at Ipswich, Mass., and later the Woodstock Academy at Woodstock, Vt.; afterward taught school in that vicinity. His intention was to have paid his way through college.

In early life he suffered from typhoid and rheumatic fevers, going for a time to Dr. Jackson's sanitarium at Danville, N. Y. There he improved in health; afterward he went to Hot Springs, Ark.

During a business career in Tiffin, Ohio, he was a member of the Tiffin Water Board. Later he concluded to enter the Harvard Medical School in 1883, partially with a view of becoming a physician, in order to study his own condition and benefit thereby. After passing all the examinations at the close of the first year, owing to financial reverses, he concluded to change to the dental school, graduating in the class of 1886, of which he was secretary.

For eleven years (1891-1902) he was instructor in operative dentistry, Harvard University. He was an active member of the Harvard Odontological Society from 1887 to his death.

The anniversary orator in 1891 and its editor from 1889-1899.

A member of the Harvard Dental Alumni Association from June, 1886, to his death.

Secretary for three years, 1892-1895.

Was a member of the Massachusetts Dental Society, 1894-1901; councillor to the Massachusetts Dental Society, 1895-1899; editor of the Massachusetts Dental Society, 1898-1899.

Dr. Upham was an honored member of the profession, an able practitioner, writer, thinker and teacher, universally loved and respected by his clientele and confreres for his high ethical standing and his scholarly attainments.

Few men in our profession are so greatly loved and respected by those who were so fortunate as to know him intimately, and no one in the

community in which he lived will be more greatly missed or more sincerely mourned. His was a great nature, and his sympathetic hand and heart were felt where sympathy was needed.

*Resolved*, That in his decease we have suffered the loss of a member who had an active interest in this society, and the welfare of the profession at heart.

*Resolved*, That we, the members of the Harvard Odontological Society, express to the members of his bereaved family our sympathy and sorrow in their affliction and assure them of our admiration for his high personal and professional qualities.

*Resolved*, That these resolutions be spread upon the records of this society, a copy be sent to the family of our departed member, and copies be sent to the dental journals for publication.

WALDO E. BOARDMAN,  
JULIUS G. W. WERNER,  
LYMAN F. BIGELOW,  
Committee.

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### **Miller Memorial.**

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At a meeting of the Columbus Dental Society of Columbus, Ohio, held Tuesday, March 23, 1909, the following resolutions were adopted:

WHEREAS, The late Dr. Willoughby D. Miller, who devoted his life to untiring research for the benefit of dental science, was an American and an Ohian by birth;

AND, WHEREAS, It is desired to obtain an expression of opinion from the various dental societies and associations meeting during the interval pending the next meeting of the Ohio State Dental Society (December, 1909);

*Therefore, be it Resolved*, That the Columbus Dental Society of Columbus, Ohio, suggest the advisability of raising a fund for a suitable memorial by the dental profession of America, to commemorate the life and work of the said Dr. Willoughby D. Miller; said memorial to take such form as may be determined by the consensus of opinion of the various dental organizations of this country.

*Be it further Resolved*, That the Ohio State Dental Society, at its next annual meeting, be requested to take charge of the Miller American Memorial matter and of such correspondence as may be received pertaining to the same.



# SOCIETY ANNOUNCEMENTS

## National Society Meetings.

National Association of Dental Faculties, Old Point Comfort, Va., August 2, 3, 4, 1909.

National Association Dental Examiners, Old Point Comfort, Va., August 2, 3, 4, 1909.

## State Society Meetings.

Alabama Dental Association, Anniston, Ala., May 11, 1909.

Arkansas State Dental Association, Hot Springs, Ark., May 26, 27, 28, 1909.

Colorado State Dental Association, Colorado Springs, Col., July 12, 13, 14, 1909.

Florida State Dental Society, Ocala, Fla., June 17, 18, 19, 1909.

Georgia State Dental Society, Cumberland Island, June 1, 2, 3, 1909.

Iowa State Dental Society, Des Moines, Ia., May 4, 5, 6, 1909.

Indiana State Dental Association, Indianapolis, Ind., June 29, 30, July 1, 1909.

Maine Dental Society, Portland, Me., June 24, 25, 26, 1909.

Massachusetts Dental Society, Boston, Mass., June 9, 10, 11, 1909.

Michigan State Dental Society, Kalamazoo, Mich., June 29, 30, July 1, 1909.

Minnesota State Dental Association, Lake Minnetonka, Minneapolis, Minn., June 22, 23, 24, 1909.

Mississippi State Dental Association, Natchez, Miss., May 11, 12, 13, 1909.

Missouri State Dental Association, Kansas City, Mo., May 26, 27, 28, 1909.

Nebraska State Dental Society, Lincoln, Neb., May 18, 19, 20, 1909.  
New Hampshire and Vermont Dental Societies, Weirs, N. H., May 18, 19, 20, 21, 1909.

New Jersey State Dental Society, Asbury Park, July 22, 23, 24, 1909.



New Mexico Dental Society, Albuquerque, N. M., June 17, 18, 1909.

New York State Dental Society, Albany, N. Y., May 6, 7, 8, 1909.

North Carolina State Dental Society, Asheville, N. C., June 23 to 26, 1909.

Ohio State Dental Society, Columbus, O., December 7, 8, 9, 1909.

Oklahoma State Dental Society, Oklahoma City, Okla., June 3, 4, 5, 1909.

Oregon State Dental Association, Portland, Ore., July 12, 13, 14, 1909.

South Dakota State Dental Society, Huron, S. Dak., June 29, 30, July 1, 1909.

Tennessee State Dental Association, Memphis, Tenn., May 25, 26, 27, 1909.

Texas State Dental Association, Waco, Texas, June 10, 11, 12, 1909.

Utah State Dental Society, Logan, Utah, latter part of June or first part of July.

Virginia State Dental Association, Chase City, Va., June 21, 22, 23, 1909.

Washington State Dental Society, Seattle, Wash., July 15, 16, 17, 1909.

West Virginia State Dental Society, Wheeling, W. Va., October 13, 14, 15, 1909.

Wisconsin State Dental Society, Milwaukee, Wis., July 13, 14, 15, 1909.

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### National Dental Association.

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The thirteenth annual meeting of the National Dental Association, held at Birmingham, Ala., March 30 to April 2, was a most successful one with a good attendance.

The papers and discussions were exceedingly interesting and held the close attention of large audiences throughout.

Official action was taken providing for a National Dental Journal, commencing October, 1910.

The committee on revision of constitution and by-laws presented a number of amendments embodying a liberal plan of reorganization. Copies carrying the proposed changes are to be printed and mailed to the membership at an early date, which will give ample opportunity to thoroughly understand same before final action is taken.

The following officers were elected: President, Burton Lee Thorpe, St. Louis, Mo.; vice-president for the West, W. T. Chambers, Denver,



Col.; vice-president for the East, Charles W. Rodgers, Boston, Mass.; vice-president for the South, Thomas P. Hinman, Atlanta, Ga.; corresponding secretary, H. C. Brown, Columbus, O.; recording secretary, Charles S. Butler, Buffalo, N. Y.; treasurer, A. R. Melendy, Knoxville, Tenn. Executive Committee (new members for three years): C. M. Work, Ottumwa, Iowa; V. H. Jackson, New York City; W. G. Mason, Tampa, Fla. Executive Council: H. J. Burkhart, Batavia, N. Y.; B. Holly Smith, Baltimore, Md.; A. H. Peck, Chicago, Ill.; W. E. Boardman, Boston, Mass.; C. L. Alexander, Charlotte N. C.

Denver Col., and the third Tuesday of July, 1910, were chosen as the place and date of the next meeting.

H. C. BROWN, Cor. Secretary.

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### National Association of Dental Faculties.

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The National Association of Dental Faculties will hold their annual meeting in connection with the National Association of Dental Examiners in the Hotel Chamberlain, Old Point Comfort, Va., August 2, 3 and 4, 1909, commencing at 10 a. m.

Rates will be the same as the National Association of Dental Examiners. Railroad and steamship rates will be given at a later date.

B. HOLLY SMITH, Chairman Executive Committee.

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### National Association of Dental Examiners.

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The twenty-seventh annual meeting of the National Association of Dental Examiners will be held at the Hotel Chamberlain, Old Point Comfort, Va., the first session opening at 10 o'clock a. m., Monday, August 2, 1909, and continuing during the 3d and 4th.

The result of the mail vote by the committee to ascertain the consensus of opinion as to place and date, from October 19 to the present date, was ninety-one votes for Old Point Comfort the first three days of August, thirteen for Birmingham in March, seven for Birmingham in July; the president has, therefore, selected Old Point Comfort.

The rates will be: American plan \$3 per day without bath and \$4 per day with bath. Large and commodious meeting rooms will be furnished free. Railroad and steamship rates will be furnished at a later date.

CHAS. A. MEEKER, Secretary.



## Twenty-Sixth Annual Convention, Delta Sigma Delta.

Seattle, Wash., July, 1909.

The following will interest those who may attend the Delta Sigma Delta meeting at Seattle, Wash., in July. Arrangements have been completed with the New York Central lines to operate a special train from New York to Seattle, as a section of the train carrying the Western delegation. The train will be a counterpart of the famous "Wolverine," with buffet, library, smoking-car, dining-car, Pullman standard sleeping-cars and compartment-car, and will be operated on the following schedule:

### SATURDAY, JULY 10.

Leave New York, Grand Central Station .....	4.30 p. m.
Leave Albany .....	8.00 p. m.
Leave Utica .....	10.18 p. m.
Leave Syracuse .....	11.45 p. m.

The New England delegation will leave as follows, joining the New York party at Albany:

Leave Boston, via Boston & Albany Railroad .....	1.45 p. m.
Leave Worcester .....	2.56 p. m.
Leave Springfield .....	4.27 p. m.
Leave Pittsfield .....	6.10 p. m.
Arrive Albany .....	7.50 p. m.

### SUNDAY, JULY 11.

Leave Detroit .....	8.25 a. m.
Arrive Chicago, via Michigan Central Railroad .....	3.30 p. m.

The Chicago, Milwaukee & St. Paul Railway has been selected as the official route between Chicago and St. Paul, and special sleeping-cars and dining-car (same high-class standard equipment as run on all the limited trains of this railway) have been assigned for the exclusive use of delegates making the Yellowstone Park Tour en route, same to leave Chicago from the Union Passenger Station, Canal and Adams Streets, as a section of the famous Pioneer Limited train, at 6.30 p. m., Sunday, July 11. This train will arrive at Union Station, St. Paul, about 7.25 a. m., Monday, July 12, and leave, via the Northern Pacific Railway, from same station, about 9.15 a. m.

For the accommodation of the second party special sleeping-cars and dining-car will leave Chicago as a section of the Pioneer Limited train, 6.30 p. m., July 16. This train will arrive, Union Station, St. Paul, 7.25 a. m., Saturday, July 17, and leave via the Northern Pacific from same station, about 9.15 a. m. The Eastern delegates who do not desire the Yellowstone Park trip may leave New York on the same schedule as above, Thursday, July 15, 4.30 p. m., and arrive in Chicago 3.30 p. m., Friday, July 16, in time to connect with the Western delegation leaving 6.30 p. m.



In purchasing tickets be sure to have the same routed, on the west-bound trip, via the New York Central to Buffalo, Michigan Central to Chicago; Chicago, Milwaukee & St. Paul to St. Paul; Northern Pacific to Seattle, which is the official route. Tickets may be routed returning via any of the following lines, at the option of the passenger:

Route No. 1—Returning same way.

Route No. 2—Returning Great Northern Railway.

Route No. 3—Returning Canadian Pacific Railway.

Route No. 4—Returning Oregon Railway & Navigation Co., Oregon Short Line and Denver or Colorado Springs.

Route No. 5—Returning via San Francisco or Los Angeles and any direct lines, either through Chicago or St. Louis.

In the event that there should not be sufficient number to justify the operation of special train, an excess fare of \$4.00 per capita will be charged (from New York only) for fast time and superior service, and the cars will be attached to the regular train from New York to Chicago, and the special train from Chicago.

#### RATES.

Routes 1, 2, 3 or 4.....	\$92.00
Route 5 .....	107.25

Pullman rates for double berth, one way, \$19.00; section, \$38.00; stateroom, \$53.50; drawing-room, \$67.00.

From Boston—Railroad fare, Routes 1, 2, 3 or 4, \$94.95; Route 5, \$110.20. Berth, \$19.50; section, \$39.00; stateroom, \$55.00; drawing-room, \$69.00.

#### YELLOWSTONE PARK TRIP.

The Yellowstone Park trip will occupy five and one-half days, and the cost, including stage rides and hotel bills, will be \$55.00. Those making this trip will join the second party as they reach Livingston, and from there on all will travel together to Seattle.

Those intending to start from Chicago will communicate as early as possible with Dr. Hart J. Goslee, 92 State Street, Chicago, Ill., for sleeping-car reservations, etc.

All those in the East who can start from New York or Boston will please communicate with Dr. R. Ottolengui, 80 West 40th Street, New York City, for sleeping-car reservations, etc.

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#### Southern Wisconsin Dental Association.

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The fifteenth annual meeting of the Southern Wisconsin Dental Association will be held in Beloit, Wis., June 3 and 4, 1909.

C. W. COLLVER, Secretary.



## Indiana State Dental Association.

The fifty-first annual meeting of the Indiana State Dental Association to be held at Indianapolis, June 29, 30 and July 1, will be a profitable meeting to those attending, a meeting that will be noted for its many practical suggestions.

C. D. Lucas, chairman of the Executive Committee, has completed arrangements for six excellent papers. Four of these from our own State and two from special guests from outside the State.

W. S. Kennedy, supervisor of clinics, promises the largest, the best, and most practical clinic in our history.

No dentist in Indiana who cares for his mental improvement can afford to miss this meeting. Mark off the dates. Do it now!

OTTO U. KING, Secretary.

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## Northern Ohio Dental Association.

The fifty-second annual meeting of the Northern Ohio Dental Association will be held in the Central Y. M. C. A. Building, Cleveland, O., June 1, 2, 3, 1909.

The programme as arranged offers a few timely papers, a large number of helpful clinics and a generous display of instructive exhibits. The place of meeting is convenient. Cleveland provides diversity of entertainment for the visitors. On the whole everything is in keeping to provide a profitable three days for the men in attendance.

F. M. CASTO,  
G. F. WOODBURY,  
J. H. WIBLE,  
Executive Committee.

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## Alumni Association of the Atlanta Dental College.

A meeting of the Alumni Association of the Atlanta Dental College will be held in the operatory of the college, April 30, 1909. A large number of clinicians, selected principally from the Alumni, will be present, which, with the social feature, will make the occasion a memorable one.



## Iowa Board of Dental Examiners.

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The next meeting of the Iowa State Board of Dental Examiners for examination will be held at Iowa City, beginning June 7, 1909, at 9 a. m.

Practical examinations will be held in both operative and prosthetic dentistry.

Applications must be in the hands of the secretary by June 1.

For further information address,

E. D. BROWER, Secretary.

Le Mars, Iowa.

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## Indiana State Board of Dental Examiners.

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The next regular meeting of the Indiana State Board of Dental Examiners will be held in the State House, in Indianapolis, beginning Monday, June 7, 1909, and continuing four days. All applicants for registration in this State will be examined at this time. This will be the last meeting of the year 1909. For further information and instruction, address the secretary,

F. R. HENSHAW.

Middletown, Ind.

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## Board of Dental Examiners of the State of Maine.

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A meeting of the Maine Board of Dental Examiners will be held at the Common Council Rooms, 53 Market Street, Portland, on Monday, June 21, 1909, at 2 p. m. Theoretical examination will be in writing. Practical examination will include operations in crown work and the insertion of fillings of cohesive and non-cohesive gold foil.

All applications, together with the fee of twenty dollars, must be in the hands of the secretary on or before Monday, June 14.

DANA W. FELLOWS, Secretary.

Portland, Me.



## **South Carolina State Board of Dental Examiners.**

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The next meeting of the South Carolina State Board of Dental Examiners will be held at Glenn Springs, near Spartanburg, S. C., on June 25, 1909.

All applicants must be present and register for examination on Tuesday, 25th. For further information address,

B. RUTLEDGE, Secretary.

Florence, S. C.

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## **South Dakota State Board of Dental Examiners.**

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The next meeting of the South Dakota State Board of Dental Examiners will be held at Sioux Falls, S. D., July 13, 1909, beginning at 1.30 and continuing for three days.

Both practical and written examinations will be required of all candidates, and all applications, together with the examination fee of twenty-five dollars, must positively be in the hands of the secretary not later than July 5; otherwise they will not be admitted to examination.

G. W. COLLINS, Secretary.

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## **Minnesota State Board of Dental Examiners.**

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The Minnesota State Board of Dental Examiners will hold a special meeting for the purpose of examining applicants for license on June 7, 1909. Meetings will be held at the Dental Department of the State University in Minneapolis, Minn. All applications must be in the hands of the secretary by May 28. For blanks and further information address,

DR. GEO. S. TODD, Secretary.

Lake City, Minn.

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## **Florida State Dental Society.**

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The twenty-sixth annual meeting of the Florida State Dental Society will be held in Ocala, Thursday, June 17, 1909, continuing in session three days.

A cordial invitation is extended to ethical practitioners.

CARROLL H. FRINK, Secretary.

301-2 Masonic Temple, Jacksonville, Fla.



## Vermont Board of Dental Examiners.

The next meeting of the Vermont Board of Dental Examiners, for the examination of candidates to practice dentistry, will be held at Montpelier, July 13, 14, and 15, 1909.

Headquarters will be at the Pavilion Hotel.

Application, together with fee, \$25, must positively be in the hands of the secretary before July 1.

Application and other blanks required, including information, can be had of

J. H. JACKSON, Secretary.

Burlington, Vt.

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## North Carolina State Board of Dental Examiners.

The North Carolina State Board of Dental Examiners will meet at 10 a. m., Friday, June 18, 1909, in Ashville, N. C. All applicants must be graduates of a reputable dental college and will be required to present diplomas for inspection and register on or before the above date.

For further information, address

R. H. JONES, Secretary.

Winston-Salem, N. C.

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## Rhode Island Board of Registration.

The Rhode Island Board of Registration in Dentistry will meet for the examination of candidates at the State House, Providence, R. I., Tuesday, Wednesday and Thursday, June 22, 23, 24 1909. Application blanks and particulars may be obtained from

HARRY L. GRANT, Secretary.

1025 Banigan Building, 10 Weybosset Street,  
Providence, R. I.

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## Georgia State Dental Society.

The forty-first annual meeting of the Georgia State Dental Society will be held at Cumberland Island, June 1, 2, 3, 1909. All ethical practitioners are cordially invited.

A. H. McNEILL, Cor. Secretary.



## New Hampshire and Vermont Dental Societies.

A joint meeting of the New Hampshire and Vermont Dental Societies will be held at Hotel Weirs, Weirs, N. H., May 18, 19, 20 and 21, beginning the evening of the 18th. FRED F. FISHER, Secretary.

## Maine Dental Society.

The forty-fourth annual meeting of the Maine Dental Society will be held at the Peaks Island House, Portland, Me., June, 24, 25 and 26, 1909. It is confidently expected by the Executive Committee that this will be one of the most successful meetings ever held by this society. All ethical practitioners of dentistry are welcome to these meetings.

H. A. KELLY, Secretary,  
Portland, Me.

E. P. BLANCHARD,  
Chairman Executive Committee,  
Portland, Me.

## Pennsylvania Board of Dental Examination.

The Pennsylvania Board of Dental Examiners will conduct examinations simultaneously in Philadelphia and Pittsburg, June 9, 10, 11 and 12, 1909.

For application papers, or any other information, write to Dr. Nathan C. Schaeffer, Secretary, Dental Council, Harrisburg Pa.

W. D. DE LONG, Secretary.

## Colorado State Dental Association.

The next annual meeting of the Colorado State Dental Association will be the twenty-third and will be held in Coolardo Springs, July 12, 13 and 14, 1909.

CHAS. A. MONROE, Secretary.

## First and Second Districts Dental Society of Louisiana.

Met in the banquet Hall of the St. Charles Hotel, in monthly meeting and annual election of officers, on Wednesday February 24, 1909.

The following were elected: Dr. S. H. McAfee, president; Dr. E. J. Zeidler, vice-president; Dr. E. H. Ramelli, secretary; Dr. W. C. Richardson, treasurer. Executive Committee, Dr. J. A. Gorman, chairman; Dr. C. S. Tuller and Dr. S. S. Grosjean.

E. H. RAMELLI, Secretary.



## New Hampshire Board of Registration in Dentistry.

The next meeting of the New Hampshire Board of Registration in Dentistry for examination will be held June 2 and 3, 1909, at Masonic Banquet Hall, Manchester, N. H.

No special examinations.

Registration required before beginning practice.

A. K. SAWYER, Secretary.

Manchester, N. H.

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## Connecticut State Dental Commissioners.

The Connecticut State Dental Commissioners will meet at Hartford on Thursday, Friday and Saturday, June 24, 25 and 26, 1909, to examine applicants for license to practice dentistry.

GILBERT M. GRISWOLD, Recorder.

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## California State Dental Association and Alumni Association, College of Dentistry, University of California.

The California State Dental Association and the Alumni Association, College of Dentistry, University of California, will hold a joint meeting on July 6, 7 and 8 at the College Building, Second and Parnassus Avenues, San Francisco.

Arrangements are being made for a number of prominent Eastern dentists to be present and contribute to the clinics and papers in addition to members from the State.

Manufacturers are being solicited to make exhibits and inasmuch as there will be a series of meetings on the Coast from June 28 to July 23, it is expected that exhibitors will find it to their advantage to make the circuit.

Fuller details of programme will be announced next month.

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## Ohio State Dental Board.

The regular spring meeting of the Ohio State Dental Board will be held in the city of Columbus on June 15 to 18, 1909, for the examination of applicants for license.

All persons desiring to enter practice in this State must make written application for examination.

Applications must be in the hands of the Secretary not later than June 5, together with the fee of \$25.00.

For blank applications and further information address,

F. R. CHAPMAN, Secretary.

305 Schultz Building, Columbus, O.



## Washington State Dental Society.

The annual meeting of the Washington State Dental Society will be held in Seattle, Wash., July 15, 16 and 17. We are anticipating a large meeting and invite the whole dental profession to join us and help by their presence to make it a grand success. The meeting will be held during the Alaska-Yukon-Pacific Exposition and afford the visiting members an opportunity to see what the Pacific Coast has to offer along other lines as well as in dentistry. The buildings at the fair grounds are progressing very rapidly and all will be completed for the opening day, June 1, 1909.

F. W. HERGETT, Secretary.

## Michigan State Dental Society.

The fifty-third annual convention of this society will be held at Kalamazoo on June 29, 30 and July 1. An attractive and interesting programme is in course of preparation, and a most profitable meeting is assured.

JAMES WHITE LYONS, President.  
DON M. GRAHAM, Secretary.

## American Circulating Dental Clinic.

The Cleveland Dental Society has appointed a committee to be known as the American Circulating Dental Clinic, consisting of Drs. G. H. Wilson, W. A. Price, H. L. Ambler, H. C. Kenyon, V. E. Barnes and S. M. Weaver.

The object of said committee is to arrange an interchange of clinics with a given number of cities, probably seven, representing seven sections of the United States.

The cities under consideration are Cleveland, New York, Philadelphia, Chicago, Kansas City, Los Angeles and Atlanta.

The idea is to have each society appoint a similar committee of six to cooperate with the other cities. Each committee's duty would be to collect, say, ten of the best possible clinics from their districts. Clinics to be composed of new devices, new methods, superior pieces of workmanship, or anything the committee should select as an educational clinic of sufficient importance.

We want the *new things* brought out and believe this will be the best way to bring the different sections of the United States in close touch with one another.



We realize there are many valuable ideas and appliances lying around dormant and kept from the profession because the originator is not a writer for magazines or is too busy to take the time to exploit them.

An active committee will be able to obtain a great many such and induce the men to put them in a presentable shape for the American Circulating Dental Clinic.

We are desirous of having the committees appointed at once, so they will have until next fall to provide their display. The idea at present is to have the clinics all shipped to Cleveland first and arranged in a systematic and presentable shape for exhibition. Also to arrange the combined clinics in shipping trunks so that they may be forwarded to the next city. Each clinic is to have a short type-written explanation to accompany it, so that any member of the committee to which it is shipped could examine it and be able to explain in a few words at time of exhibition. The clinics are all to be tabulated and strict record kept so that there will not be any losses. After the clinics have made the round of the circuit Cleveland, for instance, would take out her old clinic and put in a new one, and so on around the circuit. This would give each city practically one year to collect its new exhibit.

There being seven cities in the circuit would take in the winter months, say from October to April, the probable months in which societies hold their meetings. These dates will have to be arranged later to best accommodate all.

We do not want this exchange for *convention* use, but as a grand show for the city and surrounding territory which it represents. The committee should be chosen from men who are enthusiastic and frequent conventions in order to meet with progressive men. Our committee was appointed in the following manner: two for three, two and one years, respectively. In this way the oldest members being familiar with the work would be of great assistance in keeping up the high standard of clinics which we hope to obtain.

There are more details to be worked out later and the Cleveland committee will welcome any suggestions from the other committee. But first have the committees appointed so that they can be on the lookout from now on for the new things and we can work out the details in time.

The aforesaid cities have been chosen as best representing their section of the United States and we hope to receive immediate and encouraging cooperation. If we all work together we can make these meetings the largest exhibitions of progressive dentistry ever seen.

We hope each city chosen will put its shoulder to the wheel and try to make its exhibit the best. Yours truly,

S. M. WEAVER, Chairman.